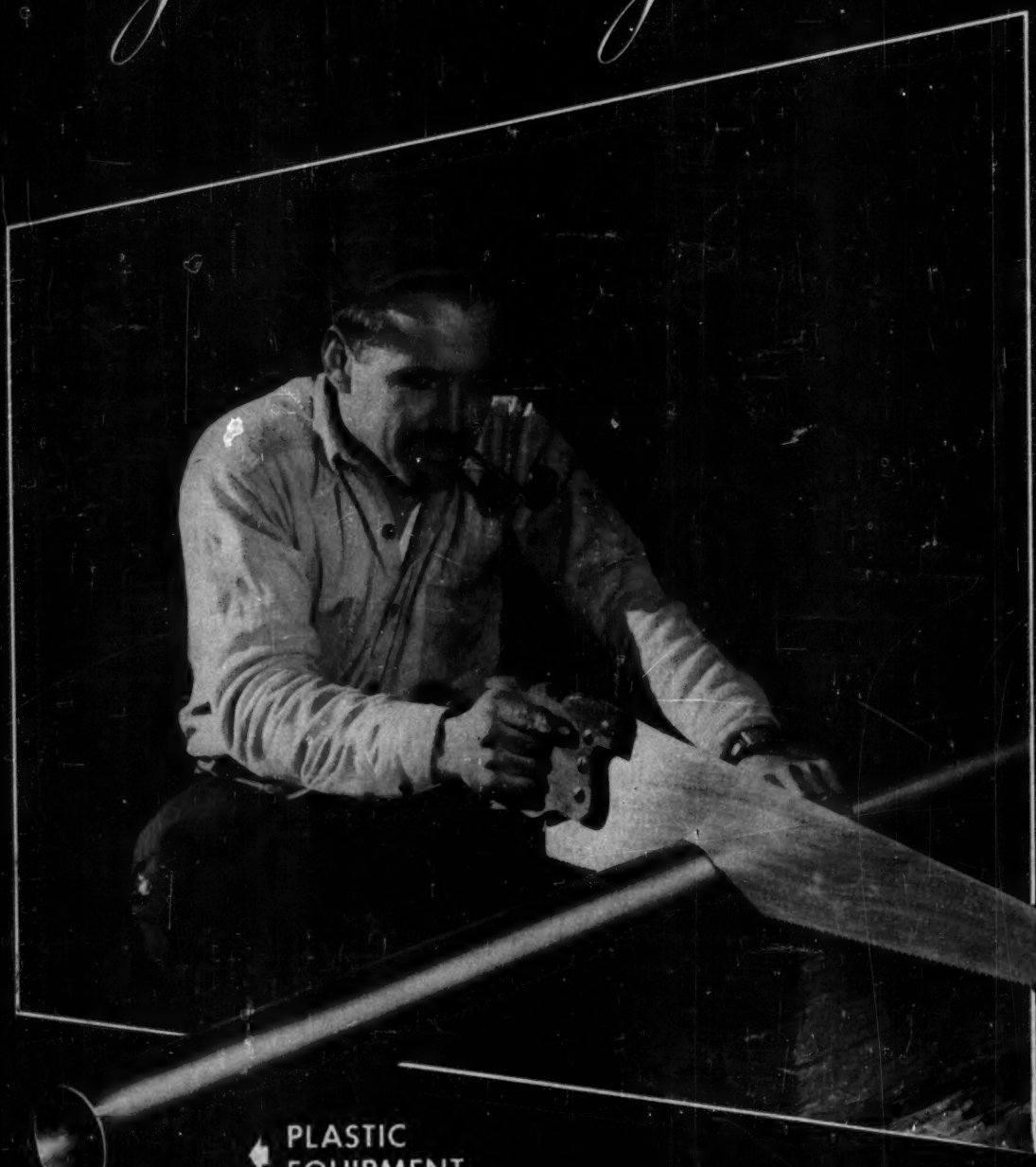
Chemical Engineering

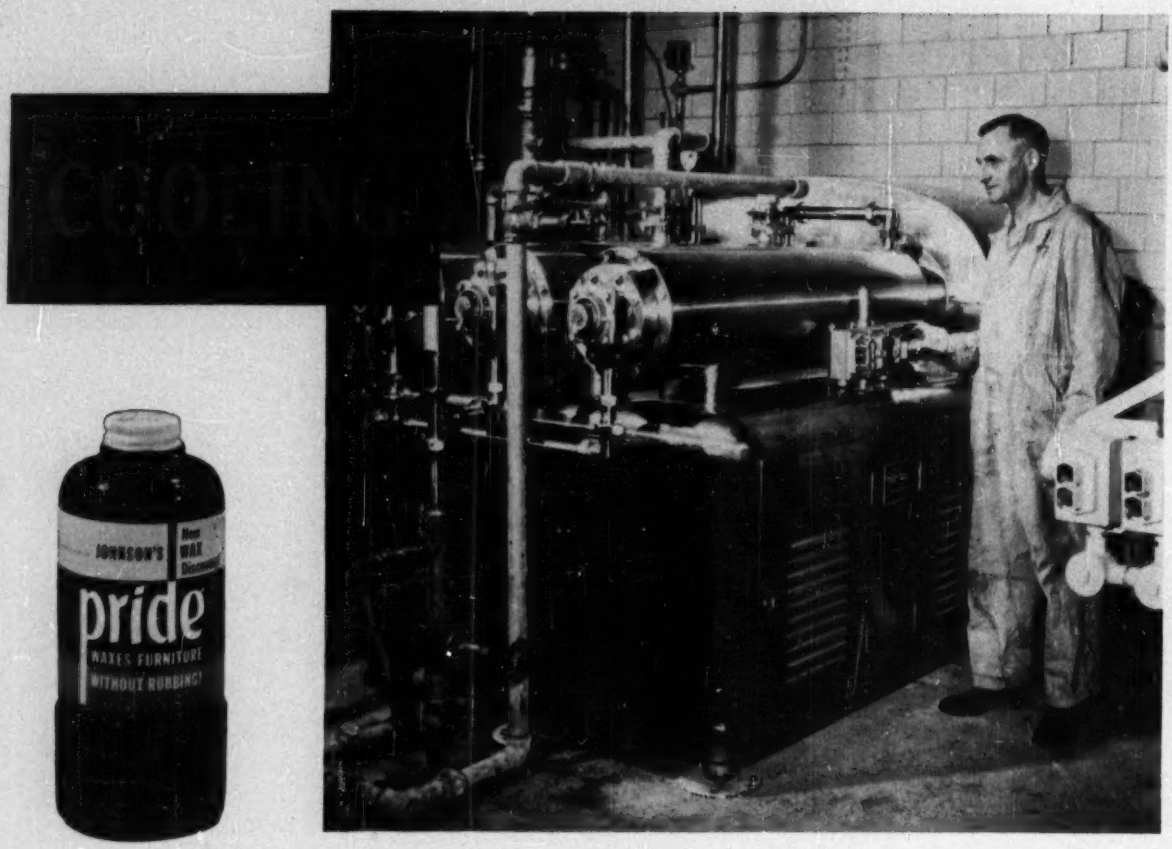
JULY 1953



PLASTIC EQUIPMENT

A McGRAW-HILL PUBLICATION

ONE DOLLAR



VOTATOR* HEAT-TRANSFER APPARATUS

quickly cools liquid wax; maintains fine particle dispersal

HIGH-SPEED continuous cooling of Johnson's wax is the key to maintaining product quality. The solution must be cooled very quickly, in order to maintain uniformity, and to prevent wax from fouling the heat-transfer surfaces.

This problem was solved with VOTATOR Heat-transfer Apparatus. A small stream of material is cooled in a matter of seconds. Close automatic control over the entire operation assures complete uniformity.

A wide variety of liquid or viscous materials can be heated or cooled with this efficient equipment. Materials can be heated as high as 700°F, or cooled as low as −100°F.

VOTATOR Heat-transfer Apparatus can also be used for crystallizing, controlling heat of reaction, emulsification and sulphonization. Write today for free 32-page booklet describing various continuous-processing systems. The Girdler Corporation, Votator Division, Louisville 1, Kentucky.

*VOTATOR—Trade Mark Reg. U. S. Pat. Off.

GIRDLER DESIGNS processes and plants

GIRDLER BUILDS processing plants

GIRDLER MANUFACTURES processing apparatus

VOTATOR DIVISION:

Complete Edible Oil Plants;

Continuous Processing Apparatus for . . .

Chemicals	Shaving Cream	Shortening
Lubricating Grease	Strained Food	Bakery Ingredients
Paraffin Wax	Salad Dressing	Confectioneries
Resins	Soup	Citrus Concentrates
Paper Coating	Margarine	And other Products
Textile Size	Lard	

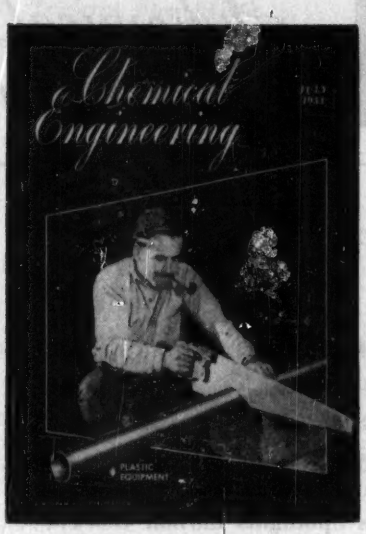
the GIRDLER Corporation

Louisville 1, Kentucky

VOTATOR DIVISION: New York, Atlanta, Chicago, San Francisco • **GAS PROCESSES DIVISION:** New York, Tulsa, San Francisco
In Canada: Girdler Corporation of Canada, Limited

GUIDED TOUR

JOHN R. CALLAHAM, EDITOR



Let's Explore Your Ideas

I often get letters from readers asking if we're interested in their ideas on subjects for articles. Of course we are; we like to get your ideas as well as your manuscripts. They help us do a better job for you and for engineers everywhere.

Here're some of the "tests" we normally apply to suggested articles: Is the subject in the field of "applied" chemical engineering? Here we emphasize the word "applied" . . . the practical, know-how, dollars-and-cents slant.

Does it give information that's new or useful? Is the subject brought up to date, correlated and interpreted so as to have real meaning and value to every engineer who reads it?

Will it interest a broad segment of engineers? CE now has close to 38,000 subscribers (highest of any monthly chemical publication) so we aim for a broad and basic appeal—not at a handful of specialists.

Yes, we're interested in your article ideas; we'll be glad to explore their possibilities with you.

. . . You'll soon be hearing plenty about plastics processing equipment.

No doubt about it. For plastics are fast taking hold as prime materials of construction for the chemical process industries. But did you ever try to get the low-down on exactly what material to use?

You'll find the answers to a lot of your questions—the where's, why's and how's—in the report by W. M. Bruner. It's factual, authoritative, up-to-date *(Feature Report)*.

Hankering for your own business?

Starting your own business is tough in any field; it's even rougher in the chemical industry. Here's a run-down of what to look for—and what to look out for (*Article*).

What's happening on eight fronts.

Gas engines can make cheap power . . . as low as 2 mills. Here's the story of what the Nordberg engine has proved it can do in big-scale jobs.

A brand-new process, developed by Lynn

Please turn page

JULY 1953

Chemical Engineering

GUIDED TOUR

Carbon Black Co., uses cheap waste gas, gives high yields. Some people say it could revolutionize the industry.

And among this month's other newsworthy technical developments: a continuous pipeline system for retorting oil shale; how Dow Corning quintupled capacity for silicone rubber; a new low-temperature purification process that scrubs with liquid N_2; more on new uses for the war-developed Absolute filter; the first U. S. newsprint-from-bagasse plant. (*What's Happening*).

How industry sees atomic power now.

Here's a report that'll give you a good idea of what to expect in the near future. It's based on material just recently declassified by AEC *(Feature Article)*.

Measure liquid levels 3,000 mi. away!

That's just what the new Varioplex system can do, and cheaply too. And in 25 sec. flat *(Process Equipment News)*.

Rejoin GUIDED TOUR page 245

CHEMENTATOR 101

WHAT'S HAPPENING IN CHEMICAL ENGINEERING

Three New Plants Open 110
Better Oil From Shale 114
New Plant for Silicone Rubber 116
Gas Engines Make Cheap Power 118
New Process Spotlights Carbon Black 120
Progress in Air Filtration 124
Scrub With Liquid Nitrogen 133
New Newsprint Process Defies Old Snares 136

PRO AND CON 146

FEATURE ARTICLES

They Succeeded in Business for Themselves ... 171
Richard V. Reeves
Heat Exchanger Costs Today—II 177
Frank L. Rubin
New Use for Phosphate Slag 182
W. C. Scott Jr. and W. D. Sandberg
Industry Teams Report on A-Power—I 188

FEATURE REPORT

Industrial Plastics 193
W. M. Bruner and P. J. Wayne

PLANT NOTEBOOK

Curves for Estimating Cooling Tanks 184
Robert S. Cook

PROCESS EQUIPMENT NEWS

Free-Piston Gas Turbine 206
Cable Triggers Fire Alarm 214
Level Gaged by Remote Control 218

PRODUCT NEWS 228

PICTURED FLOWSHEET

Maleic Anhydride 238

YOU AND YOUR JOB

Save Your Health for Your Peak Earning Years 246

CORROSION FORUM

12% Chromium Stainless Steels 262

CHEMICAL ECONOMICS

Ten Top Consumers on the Chemical Hit Parade 326

TOMORROW'S TECHNOLOGY

New High Speed Ball Mill 338
Double Solvent Extraction Yields Aromatics ... 342
Your Checklist of New Patents 344

OTHER DEPARTMENTS

Book Reviews 309
Convention Calendar 141
Industrial Notes 303
Industry Trends 334
Names in the News 280
New Technical Literature 318
Recent Pamphlets 314
Reader Service Section 425

STAFF

Publisher ..... Wallace F. Traendly
Editorial Director ..... Sidney D. Kirkpatrick
Editor ..... John R. Callaham
Managing Editor ..... Lester B. Pope
Senior Associate Editor ..... Theodore R. Olive
Associate Editor ..... Cecil H. Chilton
Associate Editor ..... Morgan M. Hoover
Assistant Editor ..... Calvin S. Cronan
Assistant Editor ..... Richard V. Reeves
Assistant Editor ..... Edward T. Thompson
News Editor ..... Joseph A. O'Connor
Editorial Assistant ..... Frances Arne
Art Editor ..... Margaret Redfield
Midwest Editor ..... Frank C. Byrnes
Southwest Editor ..... James A. Lee
Western Editor ..... Elliot Schrier
Washington Editors ..... R. S. McBride
G. B. Bryant, Jr., John Kent

CHEMICAL ENGINEERING

July 1953 Vol. 60—No. 7

Chemical Engineering (with Chemical & Metallurgical Engineering) is published monthly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office: 99-129 North Broadway, Albany 1, N. Y.

▶ **Executive, Editorial and Advertising Offices:** McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

▶ **News Bureaus:** Chicago, Houston, San Francisco, Washington, Cleveland, Atlanta, Detroit, London, Paris, Frankfurt, Rio de Janeiro, Mexico City, Tokyo, Manila. Correspondents in 44 capitals and principal cities.

▶ **Subscriptions:** Address correspondence to Chemical Engineering—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 West 42nd St., New York 36, N. Y. Allow one month for change of address.

Please indicate position and company connection on all subscription orders. Chemical Engineering solicits subscriptions only from supervisory and engineering personnel in companies in which chemical engineering and processing form an important part of the total operation and from consultants and laboratories whose field includes such process industries.

▶ **Subscription Rates:** Single copies $1. United States and possessions, $3 per year, $4 for two years, $5 for three years; Canada, $4 per year, $6 for two years, $8 for three years; other Western Hemisphere, $15 per year, $25 for two years, $30 for three years; all other countries, single copies $2 each, $20 per year, $30 for two years, $40 for three years.

Entered as second-class matter Sept. 2, 1936, at Post Office at Albany, N. Y., under act of March 3, 1879.
Printed in U. S. A. Copyright 1953 by McGraw-Hill Publishing Co., All Rights Reserved.

Convinced- by Performance!

Portion of H-D installation in a Pennsylvania chemical plant.

Sun Oil Company's Blending Process controlled by a battery of H-D Valves.

HAMMEL-DAHL CONTROL VALVES

Gulf Oil Corporation uses H-D Control Valves in this Refinery.

Lever Bros., Solexol Unit served by H-D Control Valves.

The Texas Company installed H-D Control Valves in this Giant "Cat Cracker" Unit.

Our Catalog of Bulletins will help solve Process Control Problems. Send for your copy — today.

HAMMEL-DAHL COMPANY

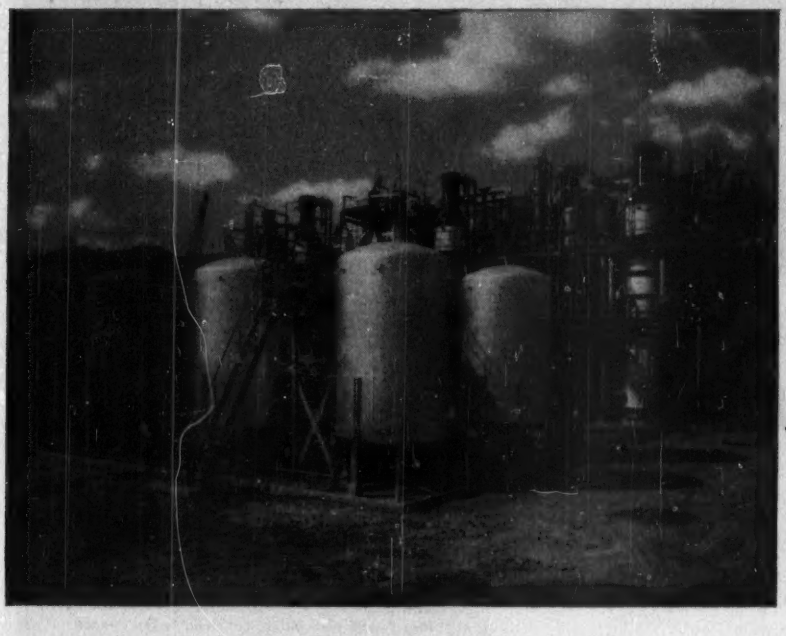
175 POST ROAD, (WARWICK) PROVIDENCE 5, R. I., U. S. A.

Albany Boston Buffalo Chicago Cincinnati Cleveland Denver Detroit Houston Kalamazoo Kansas City Kingsport, Tenn. Los Angeles New Orleans New York Pittsburgh Salt Lake City San Francisco Seattle Springfield, Mass. St. Louis Syracuse Toledo Tulsa Wilmington, Del.

MANUFACTURED AND DISTRIBUTED BY: *Canada* — The Guelph Engineering Co., Ltd., Guelph, Ontario
England — J. Blakeborough & Sons, Ltd., Brighouse, Yorks • *France* — Premafrance, Paris

for ETHYLENE OXIDE

. . . depend upon CARBIDE *. . . and you can depend on—*



unparalleled experience,

consistent, high quality,

a sure supply and

quick delivery.

One of a series of new ethylene oxide units in CARBIDE'S continuing expansion program.

Availability: drum, carload, and tank car quantities

For full information, phone or write the nearest of our 21 district offices. If more convenient, write to us at the address below.

If you use Ethylene Oxide, let us send you our safe-handling booklet "Operating Procedures for Handling Ethylene Oxide." Please ask for Form 7618.

CARBIDE AND CARBON CHEMICALS COMPANY

A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

Part of the welding floor at Grinnell's Warren, Ohio Plant

How shop fabrication of piping

keeps costs down...quality up!

When you specify piping fabricated in Grinnell shops, you are ALL to the good.

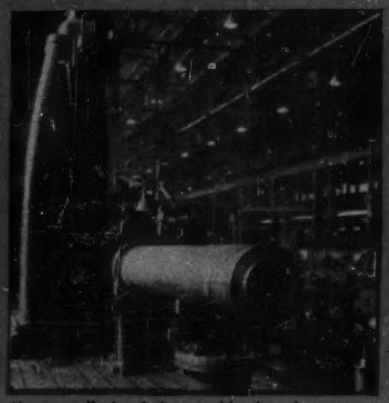
Here's why: — Included in the price (which is determined in advance) are such items of expense as:

- Interpretive engineering
- Shop sketches and planning
- Procurement of materials
- Heat, light, power, water, compressed air, expendable tools and supplies

But Grinnell even goes further. Grinnell finances material inventories and payrolls for you; carries insurance; makes no charges for waste material or spoilage.

On the production side, too, you benefit. Piping fabricated in Grinnell shops is done under ideal conditions, with modern equipment, by personnel qualified for each class of work. It is rigidly inspected and tested to meet customer's specifications and all applicable codes. Before shipment, it is cleaned inside and outside and painted. It is squared to dimensional tolerances, so that sub-assemblies can be erected at the job site quickly and easily.

You can count on it . . . Grinnell shop fabricated piping *guarantees* maximum quality and economy.



Heavy wall pipe being machined to the proper welding bevel on a pipe mill

Welding (induction heating coils in place for preheat, welding heat and stress relieving.)

GRINNELL

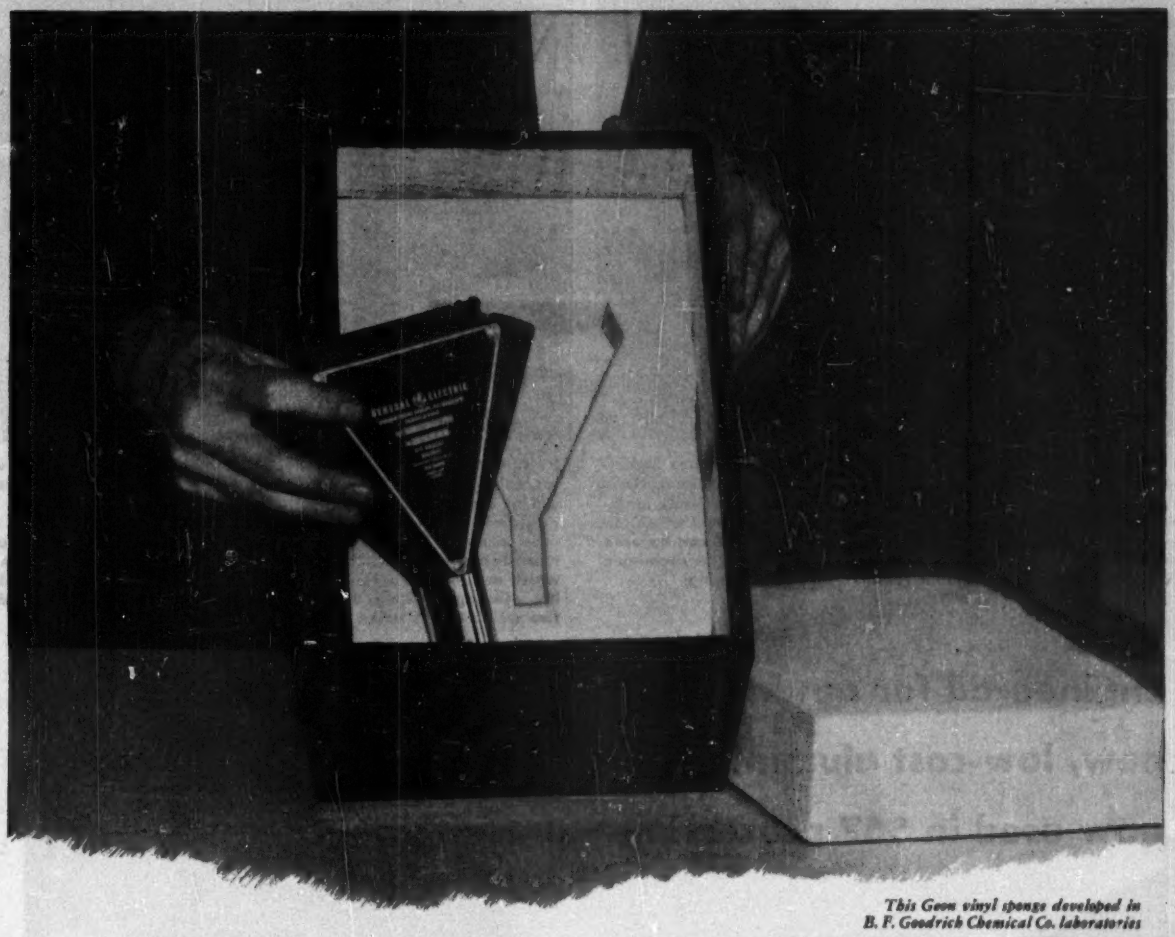
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

Another new development using

B. F. Goodrich Chemical *raw materials*



This Geon vinyl sponge developed in B. F. Goodrich Chemical Co. laboratories

How to pack a Fragile Baby!

THE cost of damage to electronic or other sensitive instruments in shipping is high, so that special packaging is needed to guard against such injury. See how well this new Geon vinyl sponge does the job!

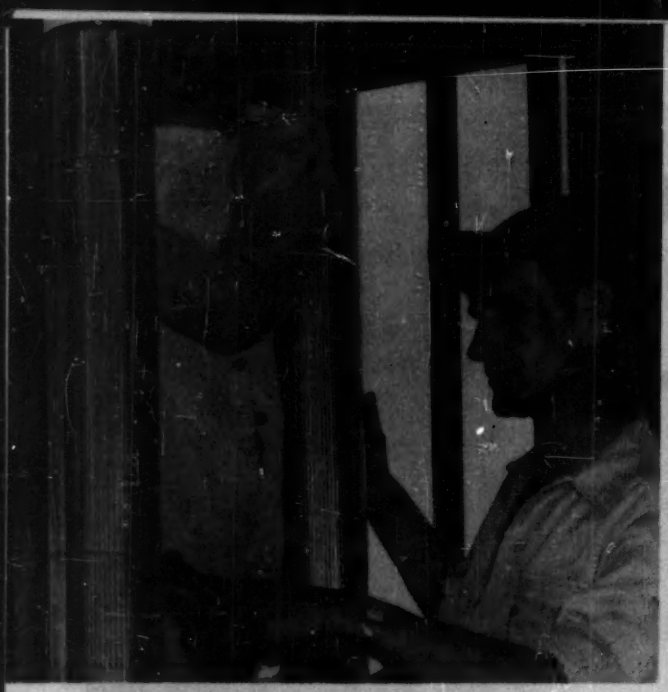
It can be molded to fit the shape, for exact and firm "holding". Then, with a top layer of the sponge, the instrument is completely and safely covered. No extra wrapping is needed.

Because this Geon vinyl sponge is resilient and shock-resistant, it cushions instruments against damaging bumps and jars. And because the sponge is made of Geon, it also resists aging, alkalis, oils, greases and many chemicals. A material that has wide possibilities for packaging optical instruments, electrical equipment and other fragile objects!

Perhaps this use of Geon may start you thinking how a Geon material—resin, plastic granules or latex—may help you solve a problem, develop or improve more saleable products. We'll help with technical advice, aid you in selecting the Geon material best suited to your needs. For information, please write Dept. GE-7, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable.

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

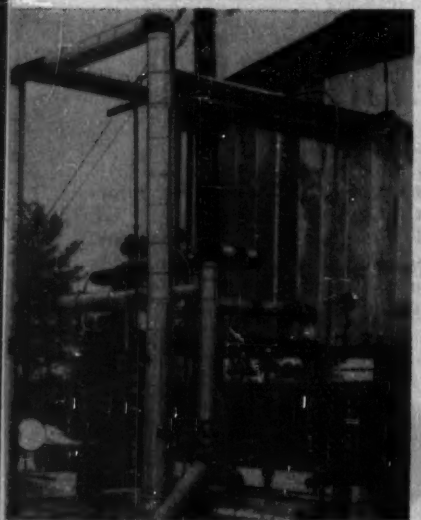


IN PETROLEUM REFINERIES like this a new kind of aluminum jacketing is used to protect the insulation on hot and cold lines. It is known as Childers Aluminum Jacketing and is especially engineered to combine the long life and weather resistance of aluminum with a low first cost. It goes on quick and easy—can be used and re-used. It is made of tough but flexible .006" 35 aluminum alloy, so it handles easily and requires no shop forming.

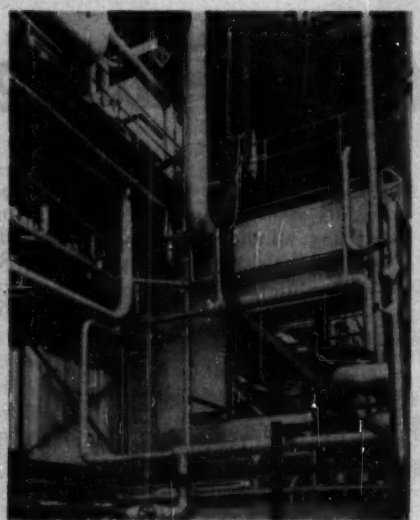
IN CHEMICAL AND PAPER plants engineers are finding new uses for this easy-to-handle jacketing. Childers Jacketing here is in use at Scott Paper Company's tremendous Chester, Pa., plant. The insulated line passes between fast moving rolls carrying the felt used in paper making both above and below the line. The Aluminum Jacketing protects against paper dust and water, both of which are always present in the manufacture of paper. The jacketing also appreciably diminishes the possibility of the spread of fire which might strike across ordinary canvas jacketing.

Engineered for outdoor lines — new, low-cost aluminum jacketing now used in 567 processing plants

The new kind of aluminum jacketing for insulated lines shown in the pictures on this page is Childers Aluminum Weatherproof Jacketing. Write for samples and full details, no obligation. Childers Manufacturing Co., Dept. CE-5, 3620 W. 11th St., Houston 8, Texas.



IN FOOD PROCESSING plants such as this Minute Maid Corp. unit at Plymouth, Fla., Childers Jacketing is useful for both indoor and outdoor installations. Its clean, shining appearance and ease of washing are extra advantages.



IN POWER PLANTS—indoors and out—Childers Jacketing is an ideal material for protecting insulation. This is a big outdoor installation in the South. This jacketing needs no painting, and the gleaming aluminum surface makes for "good housekeeping" in any utility or institutional power station.

ALMOST ANYWHERE you have insulated lines in your processing plant, consider this specially engineered jacketing. It is flexible, easy-to-handle; yet it has the appearance values and the weather resistance that are inherent in aluminum. Write to address shown above for full details.

Advertisement

ISN'T THIS A CLEAN WAY TO FILTER

FIVE MILLION POUNDS

OF SOLIDS PER DAY?

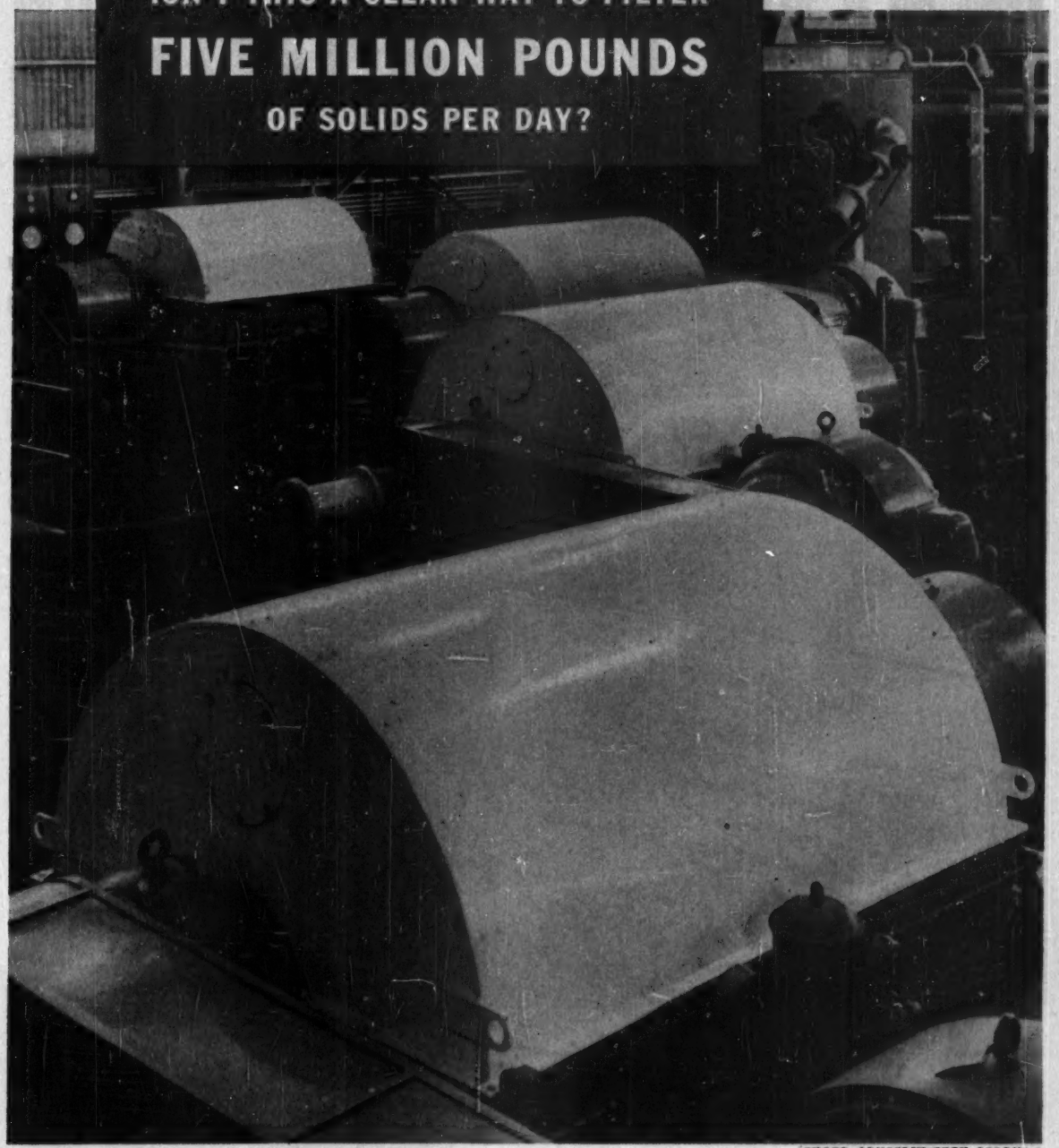


PHOTO COURTESY ARCH SPROUL

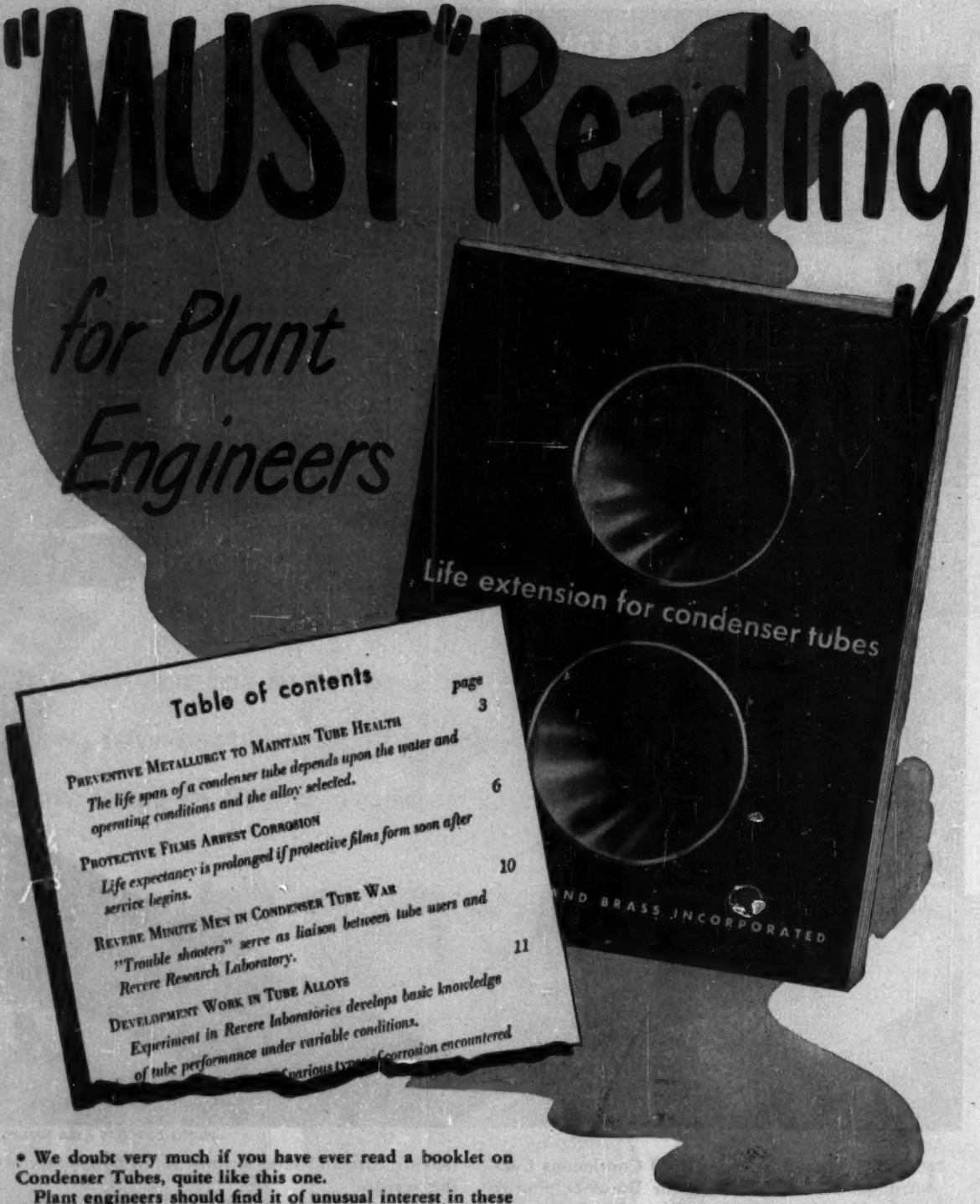
THAT'S what these four BIRD Continuous Centrifugal Filters are doing for Duval Sulphur & Potash Company, Carlsbad, New Mexico — and you can judge for yourself how neatly and cleanly they do the job.

The Birds handle the concentrated potash from the flotation cells. Duval gets a drier cake, does the job at lower first cost, operating cost and maintenance cost, and saves a whole lot of floor space in the bargain.

Why not find out what BIRD FILTERS can do to clean up *your* filtering operation and do it better and cheaper? The *Bird Research and Development Center* is fully staffed and equipped to give you the answers promptly, reliably and without obligation on your part.

BIRD MACHINE COMPANY • South Walpole • Massachusetts

"MUST" Reading for Plant Engineers


Life extension for condenser tubes
AND BRASS INCORPORATED
Table of contents page
PREVENTIVE METALLURGY TO MAINTAIN TUBE HEALTH
The life span of a condenser tube depends upon the water and operating conditions and the alloy selected. 3
PROTECTIVE FILMS ARREST CORROSION
Life expectancy is prolonged if protective films form soon after service begins. 6
REVERE MINUTE MEN IN CONDENSER TUBE WAR
"Trouble shooters" serve as liaison between tube users and Revere Research Laboratory. 10
DEVELOPMENT WORK IN TUBE ALLOYS
Experiment in Revere laboratories develops basic knowledge of tube performance under variable conditions. 11
various types of corrosion encountered

• We doubt very much if you have ever read a booklet on Condenser Tubes, quite like this one.

Plant engineers should find it of unusual interest in these times when it is more important than ever that every last ounce of use be squeezed out of the condenser tubes in their plants.

This 28-page booklet includes data on various copper alloys, photos of cut-away tube sections showing various types of corrosion encountered in condenser tube service and photomicrographs showing the grain structure of different kinds of metals under varying operating conditions.

Send for your copy today. Please make request on your firm's letterhead. Thank you. Revere Copper and Brass Incorporated, 230 Park Avenue, N. Y. 17, N. Y.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

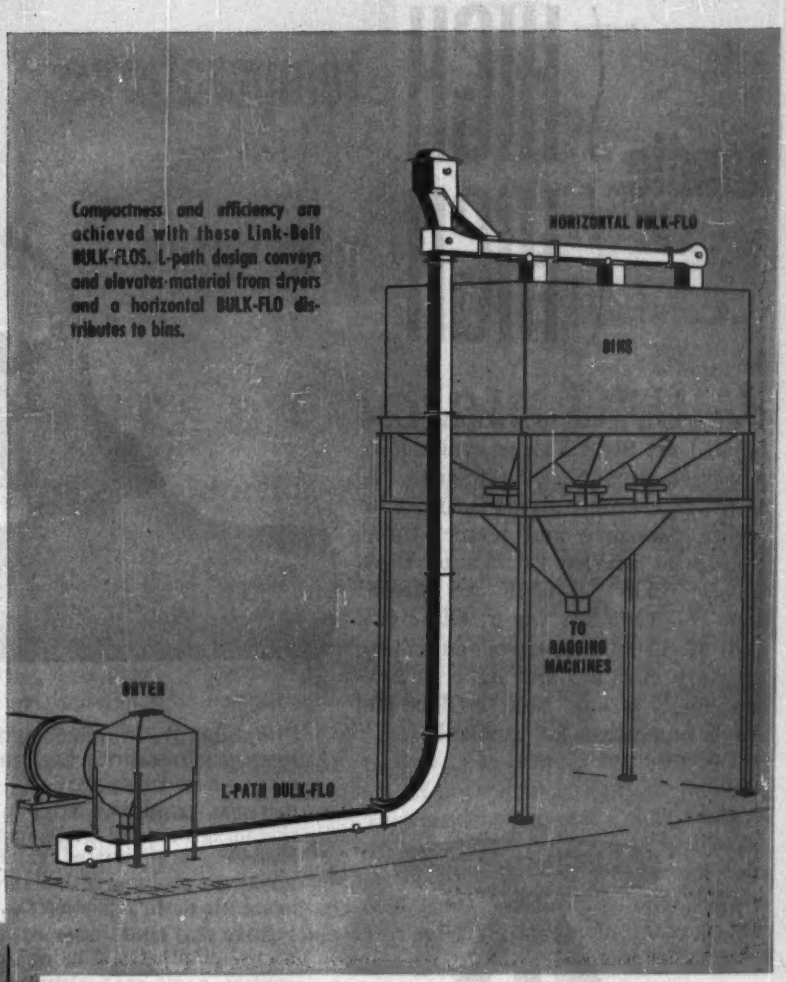
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

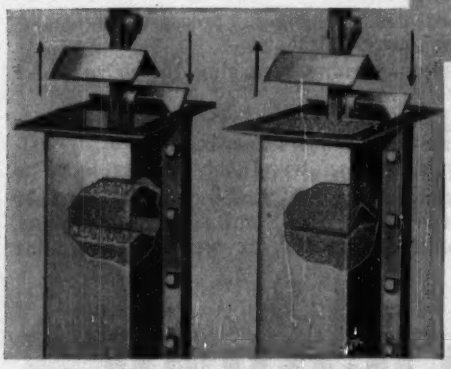
SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

With Bulk-Flo you feed, convey, elevate in one compact, fully enclosed assembly

Get lower handling costs on a wide range of materials

YES, a single BULK-FLO can move material horizontally, on an incline, vertically or many combinations of these. That means fewer units . . . less space required . . . lower costs for most handling requirements. What's more, solid flights provide positive movement of a wide variety of materials—fully or partially loaded. And the individual "compartments" insure gentle handling. Ask your nearby Link-Belt office for further information or send in coupon for Book 2475.


Compactness and efficiency are achieved with these Link-Belt BULK-FLOS. L-path design conveys and elevates material from dryers and a horizontal BULK-FLO distributes to bins.
HORIZONTAL BULK-FLO
BINS
TO BAGGING MACHINES
DRYER
L-PATH BULK-FLO



Fully or partially loaded, BULK-FLO provides positive, gentle movement of material. Unlike conventional designs, BULK-FLO's capacity can be varied by regulating feed to meet demand changes.

LINK-BELT

BULK-FLO FEEDERS, CONVEYORS, ELEVATORS 19,300

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

LINK-BELT COMPANY
Address your nearest office

Please send me immediately a free copy of your 28-page BULK-FLO Book 2475.

Name_____

Firm_____

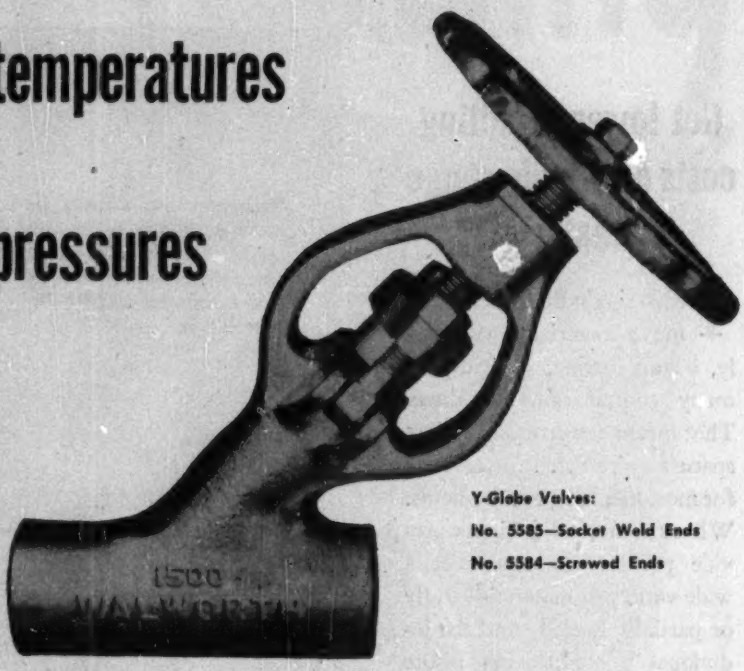
Address_____

City_____ Zn____ State_____

Walworth's NEW small cast steel valves

SERIES 1500 – SIZES ¼ to 2 inches

handle HIGH temperatures
HIGH pressures



Y-Globe Valves:
No. 5585—Socket Weld Ends
No. 5584—Screwed Ends

Walworth is proud to make these new Small Cast Steel Valves available to power stations . . . oil refineries . . . ships . . . wherever piping is subject to severe pressures and temperatures. Non-shock service ratings of these valves: 1500 psi–950F for steam; 3600 psi–100F for water, oil or gas. Cast of chromium molybdenum steel, they are compact and light, yet exceptionally strong. Both Y-Globe and Angle type valves are available.

Angle Valves:
No. 5587—Socket Weld End
No. 5586—Screwed End

Simplified Walworth design eliminates many of the valve problems encountered in high pressure service. Among the features of this new valve are:

INTEGRAL BODY AND YOKE – made from a single casting without threading or welding. Bonnet joint — always a potential source of leakage — is eliminated. Valves can be reassembled quickly and easily.

ROTATING DISC – prevents valve seat distortion and consequent leakage. Cuts down replacements.

WELDED SEAT RING – compensates for changes in pressure and temperature—eliminates a major source of leakage.

SPECIAL BACK SEAT BUSHING – permits repacking the valve under pressure with greater safety.

PACKING CHAMBER – designed to dissipate heat thus keeping packing rings at lower temperatures—gives them longer life.

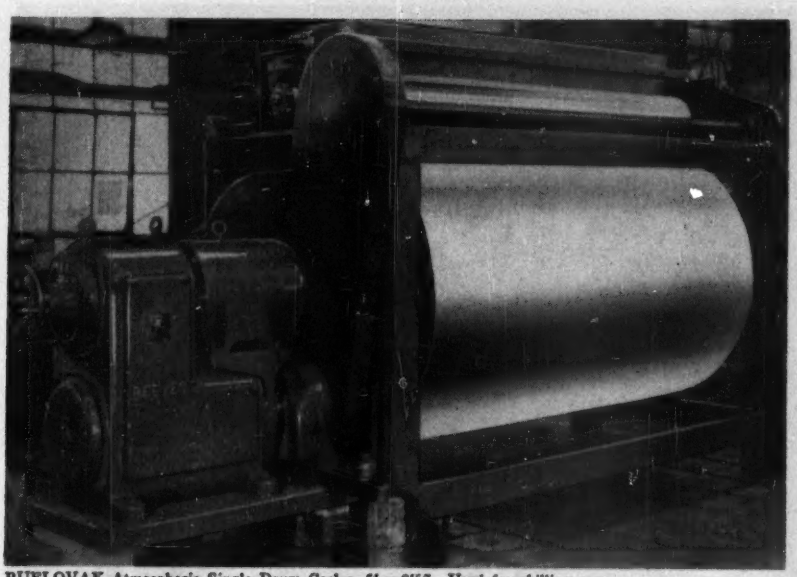
These valves are available with either socket weld ends or screwed ends, in sizes ranging from ¼ to 2 inches. For further information on Walworth series 1500 Small Cast Steel Valves, see your local Walworth distributor, or write for Circular No. 134.

WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



BUFLOVAK Atmospheric Single Drum Cooler, 5' x 8'5". Used for chilling soap.

BUFLOVAK BUILDS

EVAPORATORS

Low-Temperature
By-Product Recovery
Chemicals
Food Product
Crystallization

DRYERS

Vacuum Double Drum
Vacuum Rotary
Pilot Plant
Atmospheric

PROCESSING KETTLES

Mixers
Impregnators
Dopp Kettles
Solvent Recovery &
Distillation Equipment

SEND FOR CATALOGS

RESEARCH AND TESTING LABORATORY

To assist you in the solution of processing problems, BUFLOVAK offers the facilities of its Research and Testing Laboratory . . . where small scale experimental units show you before you buy, the commercial possibilities, data on production cost, and characteristics of the finished product.

Buflovak FLAKERS & COOLING DRUMS

New Features Speed Production . . . Lower Costs

A uniform, high quality, finished product . . . more of it . . . and at lower cost! That's the operating experience of many industries where BUFLOVAK Continuous Flakers and Cooling Drums are used. There are many new features that give new profit-building results. Large units for flaking products of low melting point have drums equipped with spray nozzles located on the inside of the drum to provide uniform cooling. For small flakers and products of high melting point, the cooling drum is provided with a special internal baffle that insures uniform cooling and exceptionally high heat transfer. The cooling mediums may include water, brine, or direct expansion.

BUFLOVAK Flakers can be equipped with a wetting roll that deposits a thin film of moisture on the surface of the drum before it dips into the hot material. This arrangement facilitates the removal of the film of product from the drum, thereby increasing production, lowering power, and greatly increasing the life of the knife.

BUFLOVAK Flakers are built in open or closed types. The latter eliminates dust and toxic hazards in handling poisonous material. They are available in several sizes of any suitable material of construction, with individual modifications to suit various applications; such as, steam jacketed, direct fired, or electrically heated feed pans.

BUFLOVAK Flakers are extensively used in the Chemical industries to produce a granular or flaked material from such products as caustic soda, phthalic anhydride, asphalt, DDT, benzine, hexachloride, pitch, naphthalene, sodium sulphide, calcium chloride, stearic acid, niter cake, many intermediates, and liquids which solidify upon cooling. This process offers continuous operation, a large capacity, and a finished product which is free from lumps.

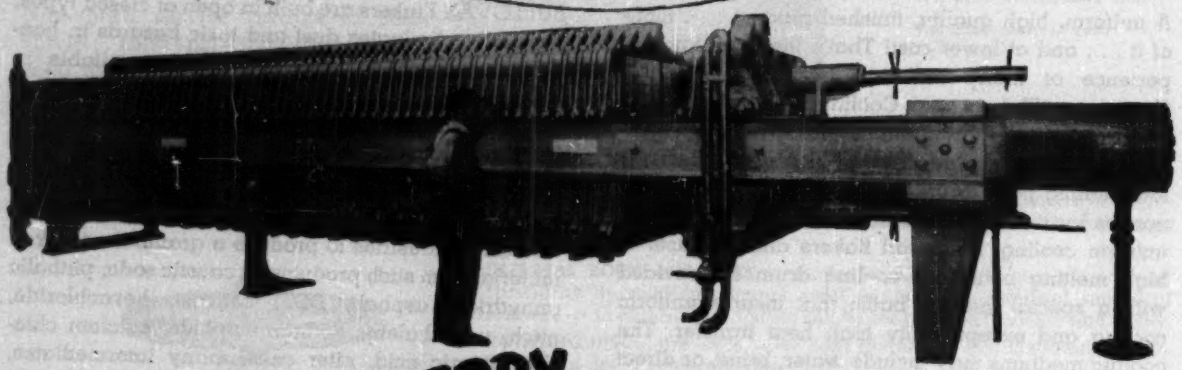
The technical staff of BUFLOVAK can help you with your flaking and cooling problems.

You will be sure of better results from BUFLOVAK!

Send for Catalog 352

BLAW-KNOX

BLAW-KNOX COMPANY
BUFLOVAK EQUIPMENT DIVISION
1549 FILLMORE AVE.
BUFFALO 11, N.Y.



SPERRY FILTER PRESSES

Whatever your requirements may be, you can depend on Sperry to provide a filter press to exactly meet specifications . . . center, side or corner feed, open or closed delivery, provision for simple or thorough washing, jacketed plate for filtering at controlled high or low temperatures . . . for use with filter bases of cloth, paper, metal screens, composition screens or combinations . . . with a choice of six different closing devices.

For over fifty years, manufacturers have looked to Sperry for the finest in filters — for hundreds of applications. Proved performance has distinguished Sperry Filter Presses throughout industry.

Complete details are included in the big free Sperry catalog. Send for *your* copy.

D. R. SPERRY & COMPANY

BATAVIA, ILLINOIS

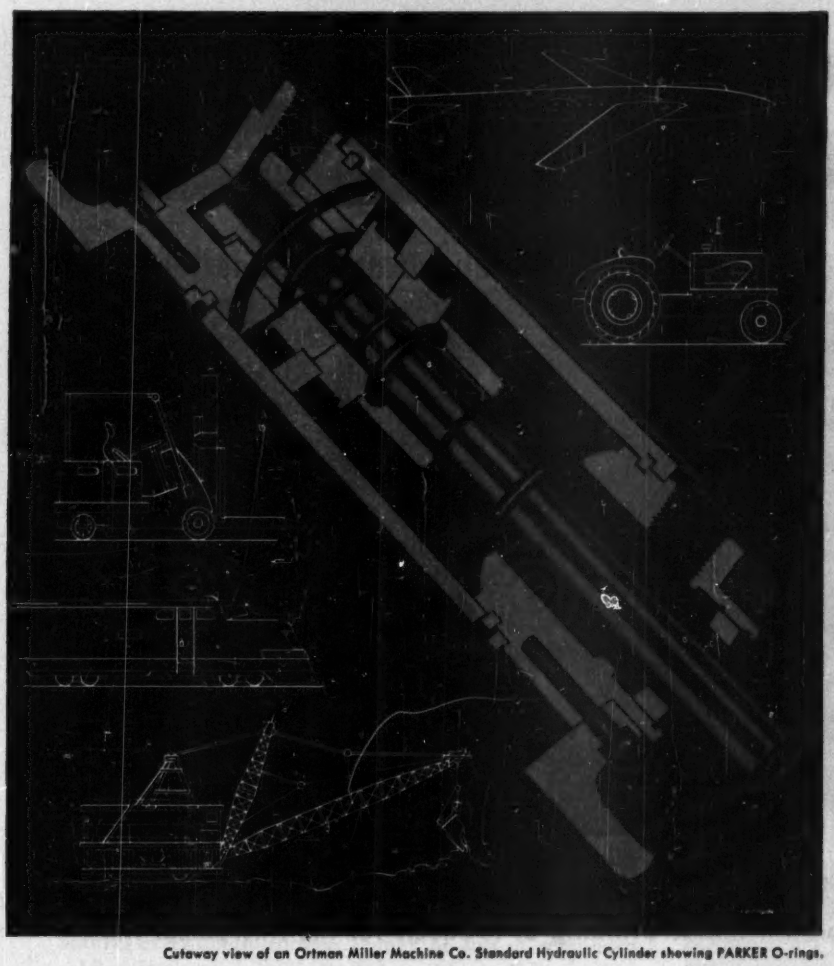
Filtration Engineers for More Than 60 Years

Eastern Sales Representative:

George S. Tarbox, 808 Nepperhan Ave., Yonkers 3, N. Y.
Yonkers 5-8400

Western Sales Representative:

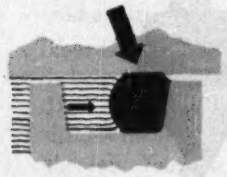
B. M. Pilhashy, 833 Merchants Exchange Bldg.,
San Francisco 4, California DO 2-0375



Cutaway view of an Ortman Miller Machine Co. Standard Hydraulic Cylinder showing PARKER O-rings.

Specify PARKER O-rings for economical, leakproof seals

THIS IS IT



Cross section drawing of O-ring in groove, sealing under pressure.

For sealing in a hydraulic cylinder . . . or for whatever service you need them, you can get PARKER O-rings, molded of expertly formulated synthetic rubber compounds, that will provide long, trouble-free sealing life. That means they are economical to use. They're economical, too, because they require no complicated design . . . just a simple groove, usually saving space and weight.

PARKER makes *all* standard O-rings for fuel, hydraulic and engine oil services as well as special-service O-rings. Ask your PARKER O-ring Distributor for Catalog 5100, or write The PARKER Appliance Co., 17325 Euclid Ave., Cleveland 12, O.

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

Parker O-RINGS

ARE STOCKED BY THESE AUTHORIZED DISTRIBUTORS

AKRON, O.
B. W. Rogers Co.
850 So. High St., Akron 9, Ohio

BOSTON, Mass.
Irving B. Moore Corp.
65 High Street, Boston, Mass.

BUFFALO, N. Y.
Hercules Gasket & Rubber Co.
327 Washington St., Buffalo 3, N. Y.

CHICAGO, Ill.
Air Associates, Inc.
5315 W. 63rd St., Chicago 38, Ill.
Shields Rubber Co.
108 N. Clinton St., Chicago 6, Ill.

CLEVELAND, O.
Cleveland Ball Bearing Co.
3865 Carnegie Ave., Cleveland, Ohio
Neff-Perkins Co.
2130 St. Clair Ave., Cleveland 14, Ohio

DALLAS, Tex.
Air Associates, Inc.
3214 Love Field Dr., Dallas 9, Tex.
Metal Goods Corp.
6211 Cedar Springs Rd., Dallas 9, Tex.

DAYTON, Ohio
J. N. Fauver Co.
1534 Keystone Ave., Dayton 10, Ohio

DENVER, Colo.
Metal Goods Corp.
2425 Walnut St., Denver 2, Colo.

DETROIT, Mich.
J. N. Fauver Co.
49 West Hancock St., Detroit 1, Mich.

FORT WORTH, Tex.
Adco Industries
3414 Camp Bowie Blvd.
Fort Worth 7, Tex.

HOUSTON, Tex.
Metal Goods Corp.
711 Milby St., Houston 3, Tex.

INDIANAPOLIS, Ind.
Korhumel Steel & Aluminum Co.
3562 Shelby St., Indianapolis, Ind.

KANSAS CITY, Mo.
Metal Goods Corp.
1300 Burlington Ave.
N. Kansas City 16, Mo.

KNOXVILLE, Tenn.
Leinart Engineering Co.
412 E. 5th Ave., Knoxville 5, Tenn.

LOS ANGELES, Calif.
Aero Bolt & Screw Co., Inc.
1071 Arbor Vitae Ave.
Inglewood, Calif.
Synthetic Rubber Products Co.
1538 South Eastern Ave.
Los Angeles 22, Calif.

MIAMI, Fla.
Air Associates, Inc.
International Airport, Miami, Fla.

MILWAUKEE, Wis.
Allrubber Products & Supply Co.
612 So. Second St., Milwaukee 4, Wis.

MINNEAPOLIS, Minn.
Van Dusen Aircraft Supplies, Inc.
2004 Lyndale Ave., South,
Minneapolis 5, Minn.

NEW YORK, N. Y.
Durham Aircraft Service, Inc.
56-15 Northern Blvd., Woodside, N. Y.
Nielsen Hydraulic Equipment, Inc.
298 Lafayette St., New York 12, N. Y.

PHILADELPHIA, Pa.
Goodyear Supply Co.
1506 Latimer St., Philadelphia, Pa.

PORTLAND, Ore.
Hydraulic Power Equipment Co.
2316 N. W. Savier St., Portland 10, Ore.

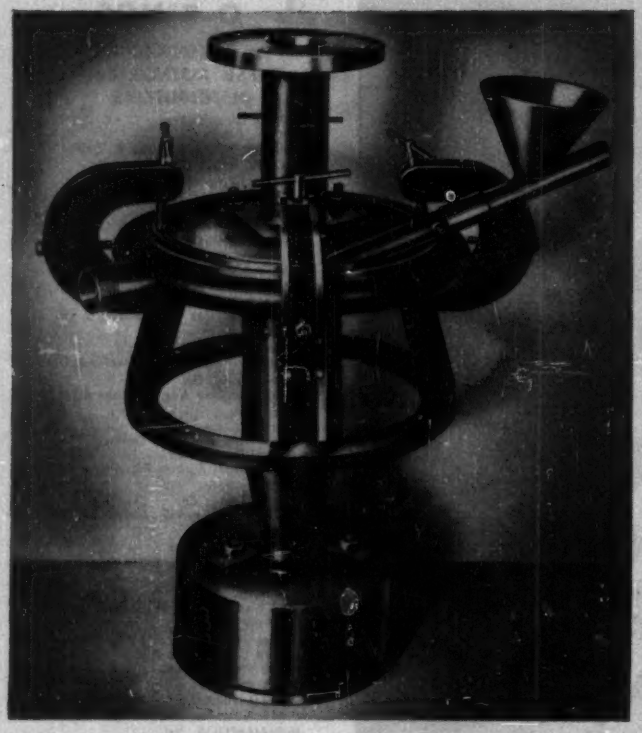
ST. LOUIS, Mo.
Metal Goods Corp.
5239 Brown Ave., St. Louis 15, Mo.

TULSA, Okla.
Metal Goods Corp.
302 North Boston, Tulsa 3, Okla.

WICHITA, Kan.
Standard Products, Inc.
650 E. Gilbert, Wichita 11, Kan.

CANADA
Railway & Power Engineering Corp., Ltd.

Announcing the STURTEVANT



MICRONIZER*

Pulverizing Machine for Reducing Materials to Micron Sizes

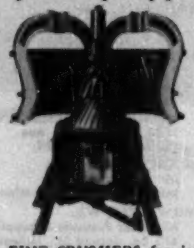
A fluid jet pulverizing machine, the Sturtevant *Micronizer* speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired.

Sturtevant *Micronizer* mills are used throughout industry for reducing non-metallic and metallic minerals and ores, pigments, insecticides, fungicides, pharmaceuticals, plastics, dyes, and numerous other organic and inorganic products.

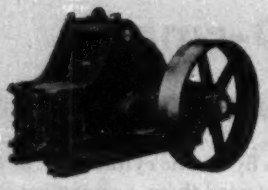
Sturtevant *Micronizer* pulverizers are available in many sizes and capacities. Write for information.

Other Sturtevant Pulverizing Equipment for Rapid Reduction of Materials...

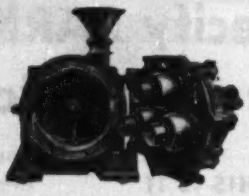
Especially Applicable for Initial Grinding of Products for the Micronizer Mill



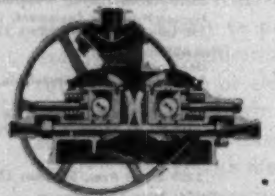
ROTARY FINE CRUSHERS for intermediate and fine reduction (down to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



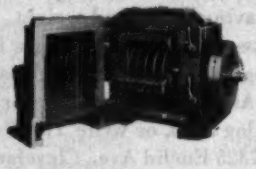
JAW CRUSHERS for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



CRUSHING ROLLS for granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8 x 5 to 38 x 20. The standard for abrasives.



SWING-SLEDGE MILLS for coarse and medium reduction (down to 20 mesh). Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

AIR SEPARATOR for separation of fines to 325 mesh and finer. Increases output from 25% to 300%... lowers power costs by 50%. Capacities ¼ to 50 tons per hour output.

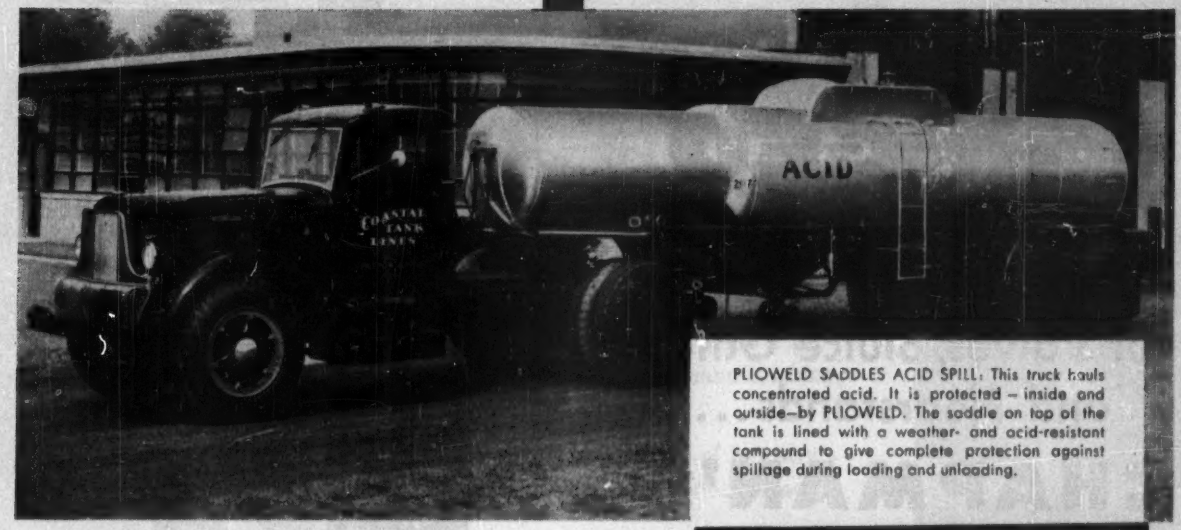
*Registered trademark of the Sturtevant Mill Company

STURTEVANT MILL COMPANY

100 CLAYTON STREET, BOSTON 22, MASS.

DESIGNERS & MANUFACTURERS OF DENS AND EXCAVATORS • MIXERS • SCREENS • PULVERIZERS • ELEVATORS • AND COMPLETE FERTILIZER UNITS

CURE FOR CORROSION
IS PREVENTION WITH PLIOWELD



PLIOWELD SADDLES ACID SPILL: This truck hauls concentrated acid. It is protected – inside and outside–by PLIOWELD. The saddle on top of the tank is lined with a weather- and acid-resistant compound to give complete protection against spillage during loading and unloading.

BEST way to cure corrosion problems is to stop them before they start. One of the best ways to do that is to use PLIOWELD — Goodyear's fully proved, protective lining and covering.

PLIOWELD is dense, resilient sheet rubber. It may be natural or synthetic rubber. It may be soft or semi-hard rubber. It always is compounded to withstand the particular corrosives or abrasives to be encountered. It always is permanently bonded to the metal to be protected by an exclusive Goodyear process.

PLIOWELD can and does resist a wide range of acids, alkalies, salts, alcohols, fumes, gases and water. It also resists abrasion. It can and is being used to protect all types of process equipment including tanks, tank cars and trucks, fans and blowers, fume hoods and ducts, pumps and piping.

PLIOWELD protects plant, product and personnel. It also greatly reduces maintenance, repair and replacement costs and assures continuous operation.

Your G.T.M.—Goodyear Technical Man—will be happy to help you solve your corrosion problems with PLIOWELD. He'll make an expert and confidential analysis of the conditions involved, then recommend the right compound for the job. You can contact him by writing to Goodyear, Industrial Products Division, Akron 16, Ohio.

7 REASONS WHY
THE G.T.M. SPECIFIES PLIOWELD

1. Effectively withstands corrosives that cannot be handled by metal.
2. Bonds permanently to metal surfaces—an exclusive Goodyear process.
3. Does not split or loosen with vibration or severe external impacts.
4. Does not crack or buckle under alternate wetting or drying or under temperature changes.
5. Surface will not disintegrate or slough off —cannot ever contaminate in-process materials.
6. Protects product from discoloration, iron "pickup" and other contaminants.
7. Each installation specially formulated to provide maximum protection against chemical handled.

We think you'll like
THE GOODYEAR TELEVISION PLAYHOUSE
every other Sunday—NBC TV Network

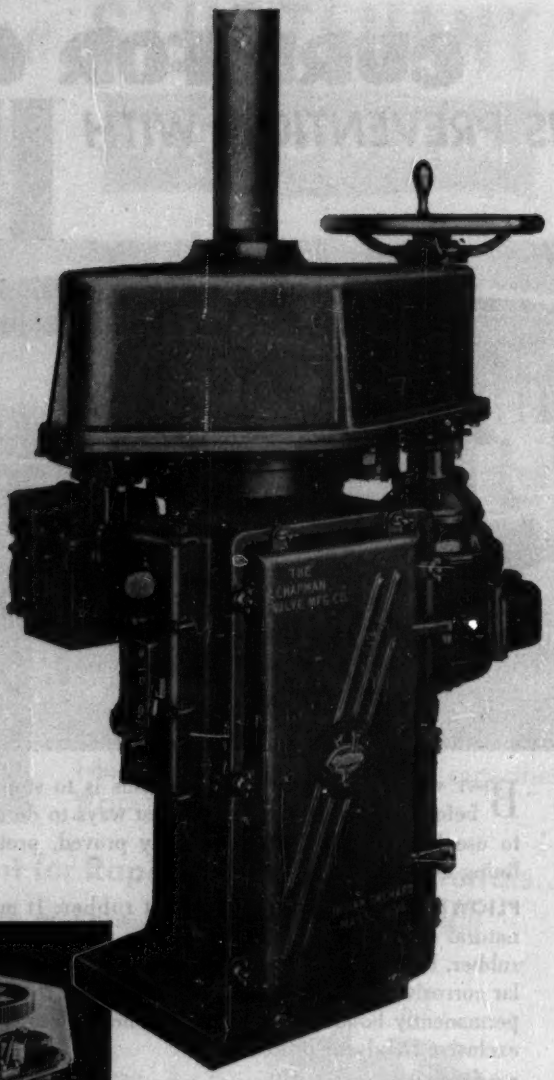
Pliowld—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR
THE GREATEST NAME IN RUBBER

RUGGED BOSS

for Valves, Sluice Gates and Floorstands...

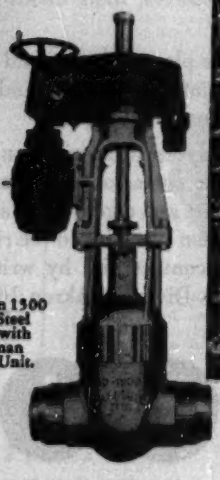
CHAPMAN'S *Motor Unit*



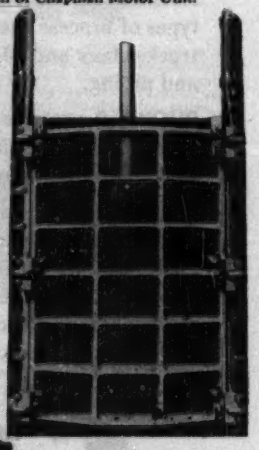
Above, Floorstand equipped with Chapman Motor Unit, Control Panel, Motor, Limit Switch and Push Button Station all completely wired. At left, Interior Mechanism of Chapman Motor Unit.

For positive control of large valves and sluice gates, the Chapman Motor Unit can safely be given your "power of attorney." The floorstands with Chapman Motor Units come to you with all wiring *complete*, so that all you have to do is bring the power leads into the connection box... which speeds up installation, insures proper operation, and saves wiring costs.

The Chapman Motor Unit is completely housed and thoroughly weatherproof. And the unit itself has the ruggedness of simplicity, with a slow-speed motor driving direct through two trains of spur gears. So there's no drift. The limit switch can be adjusted so the gate or valve closes to the exact seating position. Hand-operated, too, if the need arises. See what this modern electrically driven Motor Unit can do — *and save* — for you. Write for Catalog No. 50.



Chapman 1500 Series Steel Valve, with Chapman Motor Unit.



Chapman Standard Sluice Gate, with stem connection for Chapman Motor Operated Floorstand.

The CHAPMAN VALVE Mfg. Company
INDIAN ORCHARD, MASSACHUSETTS, U. S. A.

HEADING IN NEW DIRECTIONS*

Pointing the way to the varied uses . . . new and old . . .

of its products is an integral part of Niagara's service to industry.

NIALK® Carbonate of Potash

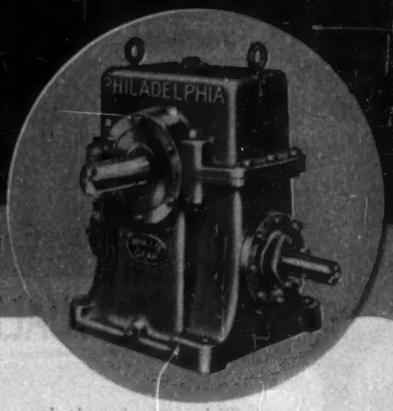
This potash salt is now playing an important role in numerous pharmaceutical and vitamin applications, where its exceptional purity and quality make it particularly helpful in meeting the high manufacturing standards of the drug field:

Careful research, plus an alert awareness of industry's requirements, help to make NIALK products leaders in their fields.

NIAGARA ALKALI COMPANY

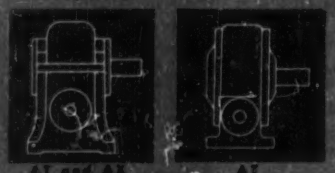
60 East 42nd Street, New York 17, New York

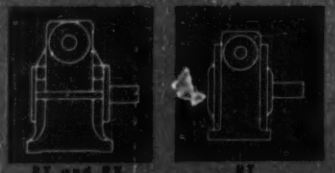
You can TAKE YOUR CHOICE

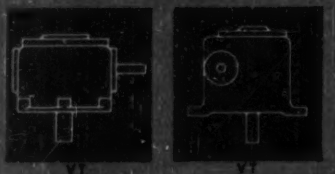


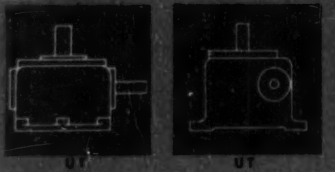
SINGLE REDUCTION

Heavy Duty — Small Units









. . . they're all Philadelphia Worm Gear Speed Reducers

Philadelphia Worm Gear Speed Reducers vary in size and arrangement, but never in quality. Each unit is backed by 60 years of gear making experience and our reputation for the best in power transmission equipment.

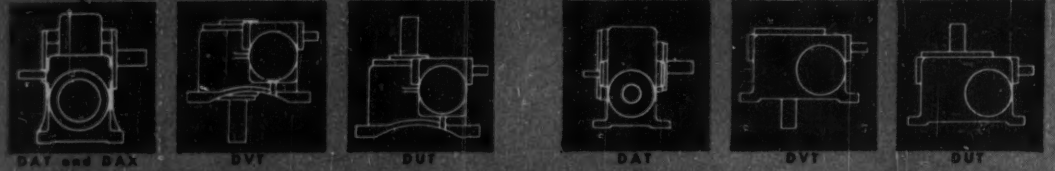
Standard worm gear reducers are available in ratings to 250 horsepower, and ratios 3½:1 to 6300:1.

For full information on Worm Gear Speed Reducers, write for catalog WG51.

HELICAL WORM UNITS

DOUBLE REDUCTION

←Heavy Duty — Small Units→

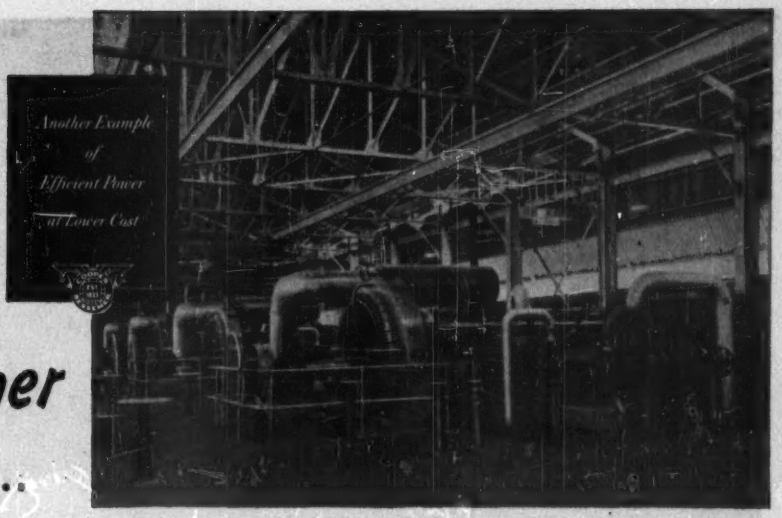


Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK · PITTSBURGH · CHICAGO · HOUSTON · LYNCHBURG, VA.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls



Cooper-Bessemer

MODERN DESIGN...

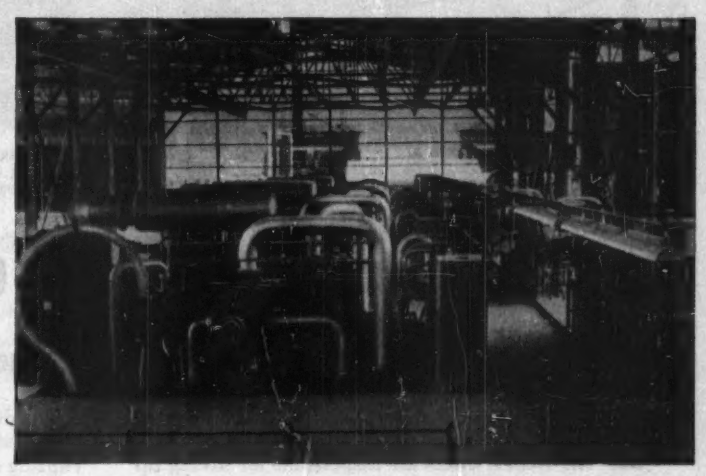
for compressors at Sindri . . . at Suez . . . everywhere!

● Shown opposite are Cooper-Bessemer motor-driven compressors in two of the world's newest and largest synthetic ammonia plants.

The top view shows part of the 22,000 Cooper-Bessemer M-Line compressor horsepower installed in the ammonia synthesis plant of the Sindri Fertilizer Factory, Bihar Province, India. Here, ammonium sulphate can be produced at a rate of 1,000 tons a day — 350,000 tons a year!

Similarly the other photo shows a line-up of Cooper-Bessemer compressors in the large Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), Egypt. Here, calcium nitrate fertilizer is produced at a rate of 200,000 tons yearly.

In both plants, these modern Cooper-Bessemer units handle the entire compressing job and comprise the heart of production operations. For, with Cooper-Bessemers, you can be sure of year-in, year-out performance at the lowest operating cost.



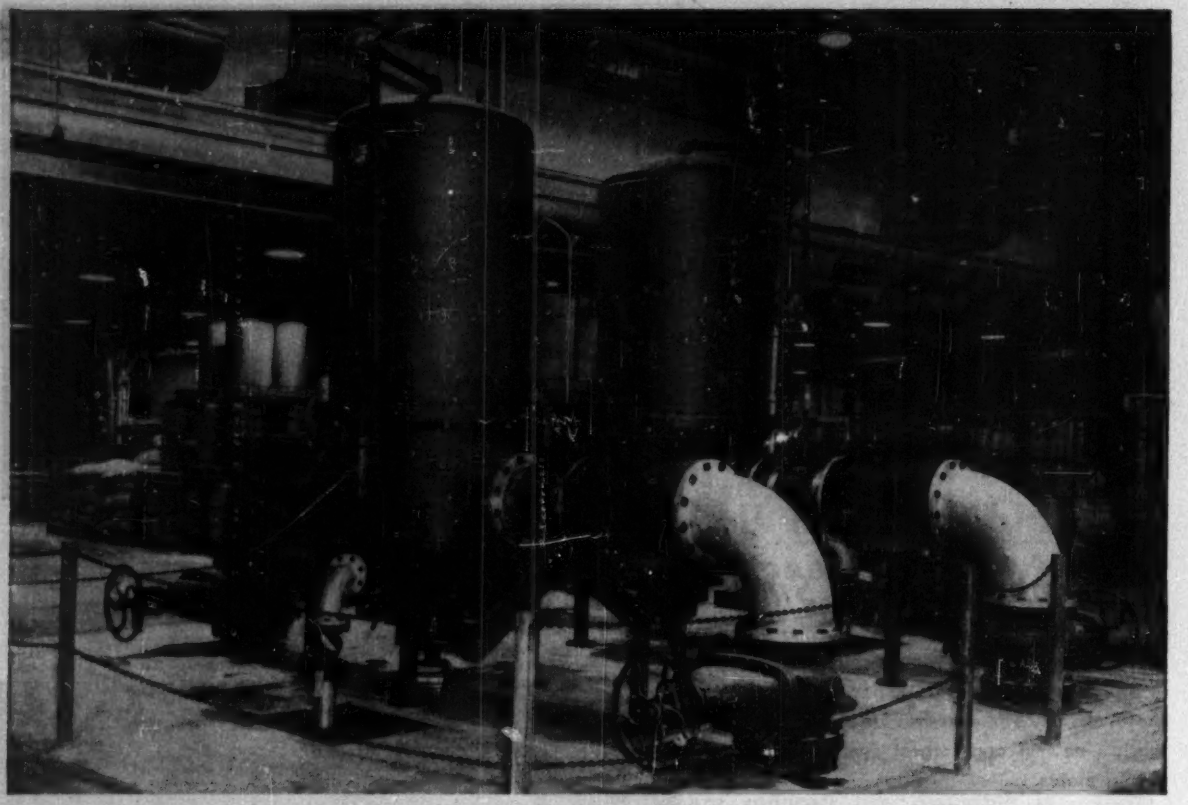
Cooper-Bessemer M-Line motor-driven compressor in the synthesis section of the Sindri Fertilizer Factory, India. Here eight 2,750 hp 7-cylinder units compress gas through six stages to a pressure of 5,500 psi. The huge Sindri plant was engineered by the Chemical Construction Corp., New York, and built under the direction and supervision of the Power-Gas Corp., Ltd., England.

Here, in the Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), these four 2,750 hp JM-5 motor-driven units compress 25,344 mcf of gas daily from atmospheric to 5,200 psi for initial calcium nitrate production of 200,000 tons yearly. This plant, engineered by the Chemical Construction Corp., utilizes waste gases from nearby oil refineries.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. New Orleans, La.



EVERY GRAIN OF SAND IS REMOVED from the well water passing through these abrasion-resistant FLO-KLEAN filters at the new Upjohn Company plant in Kalamazoo, Michigan.

Upjohn saves 2000 dollars a month

FLO-KLEAN filters protect valuable equipment at pharmaceutical plant

Maintenance records at the Upjohn Company's ultra-modern plant near Kalamazoo, Michigan, show that FLO-KLEAN filters are responsible for saving up to $2000 a month in maintenance costs.

These Cuno FLO-KLEAN filters, used to remove sand and gravel from incoming well water, ordinarily take something like a teaspoon of sand out of each thousand gallons. That doesn't appear to be an impressive quantity, but it could cause serious damage to stainless steel valves, pumps, water softeners, condensers and other valuable equipment. Purity of process water is assured by the high-capacity FLO-KLEAN units.

Recently the wall of one of their thirteen 250 feet deep wells gave way, dumping large quantities of sand and gravel into the water system. Every bit of this sudden deposit (almost seven cubic yards) was removed by the FLO-KLEAN filters. Without interrupting service, FLO-KLEAN continued its automatic operation and saved Upjohn a serious operating and maintenance loss.

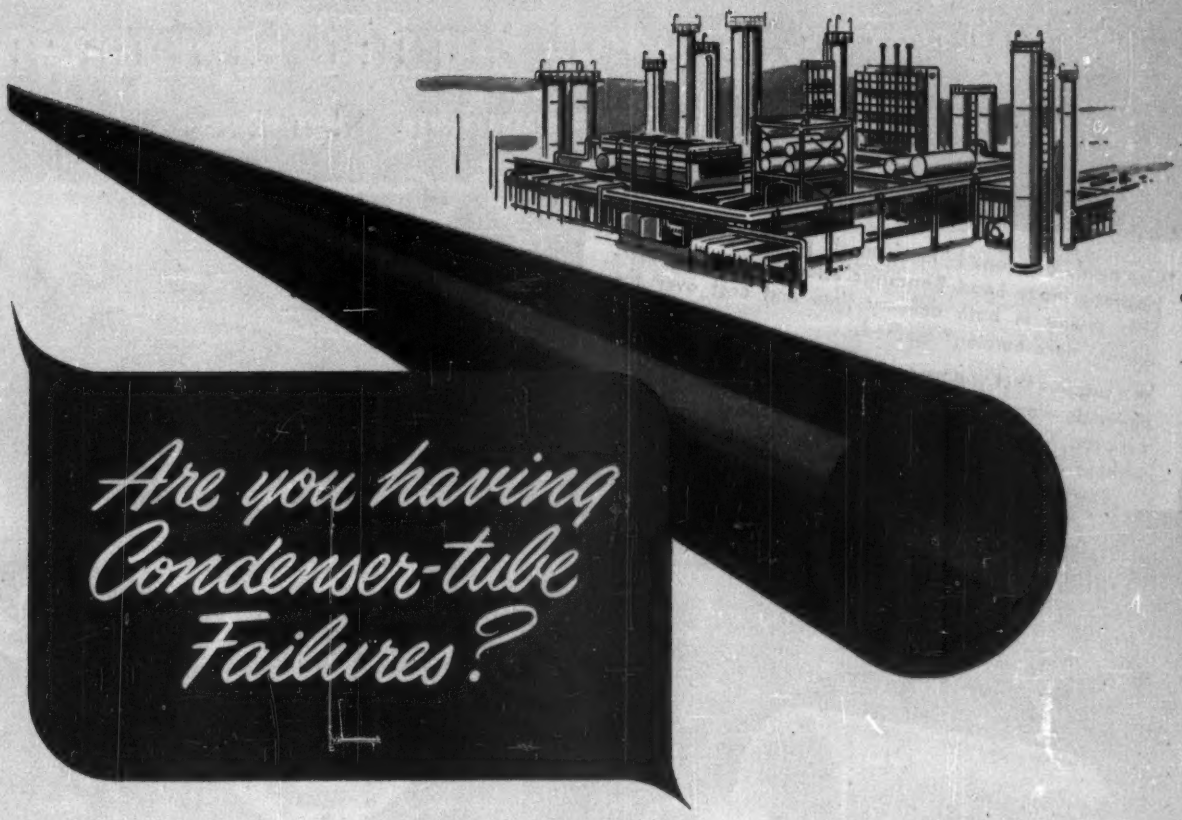
In hundreds of applications throughout industry the fully automatic, continuously self-cleaning FLO-KLEAN filters have paid for themselves many times over by making river, lake, or well water fit for industrial use . . . and without loss of backwash water. Other uses include reclaiming industrial process water and coolants. If you need or use between 200 and 100,000 gallons per minute of clean water, find out how FLO-KLEAN can save you money. Write for free FLO-KLEAN bulletin to the Cuno Engineering Corporation, Dept. 101F Meriden, Conn. 3.1

CUNO

ENGINEERED FILTRATION

Removes More Sizes of Solids From More Kinds of Fluids

AUTO-KLEAN (disc-type) • MICRO-KLEAN (fibre cartridge) • FLO-KLEAN (wire-wound)



Are you having Condenser-tube Failures?

Do you want to make your operations MORE PROFITABLE?

Let's offer this helpful suggestion: avail yourself of the specialized experience of Wolverine's staff of competent engineers. They are equipped to analyze your tube failures and make the recommendations as to the proper alloy that will best meet your particular requirement—resulting in longer tube-life and reduced operating costs.

Wolverine Tube Division produces plain condenser tube in copper and all popular copper alloys—Wolverine Trufin (the integral finned tube) in copper, copper base alloys, aluminum, bi-metal (aluminum fins with copper or copper alloy liners)—and Wolverine Electric-welded steel pressure tube.*

You'll be interested in getting a copy of our new Corrosion Chart showing various substances which produce corrosion action in metal. Sent free upon request.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

*REG. U. S. PAT. OFF.

WOLVERINE TUBE DIVISION
of CALUMET & HECLA, INC.

ESTABLISHED 1916

Manufacturers of Tubing Exclusively

1427 CENTRAL AVENUE • DETROIT 9, MICHIGAN

Plants in Detroit, Mich. & Decatur, Ala. *Sales offices in Principal Cities*

EXPORT DEPT., 13 E. 40th St., NEW YORK 16, N. Y.

Homogeneous Lead Bonded Equipment

By Our "New Mechanical" Process

Our newly developed "mechanical" process for applying Homogeneous Lead Bondings affords you a considerable saving in both delivery time and cost over the slower "hand-burning" method.

We suggest that you pay a visit to our plant and view this newly developed "Mechanical" cost-saving lead bonding process. Our Engineers are available for consultation without obligation. Your inquires are solicited.

TANKS · LEAD COILS
LEAD and LEAD LINED VALVES
SHEET LEAD LININGS
CASTINGS and FITTINGS

Custom Built for the Processing Industries

KELLEY

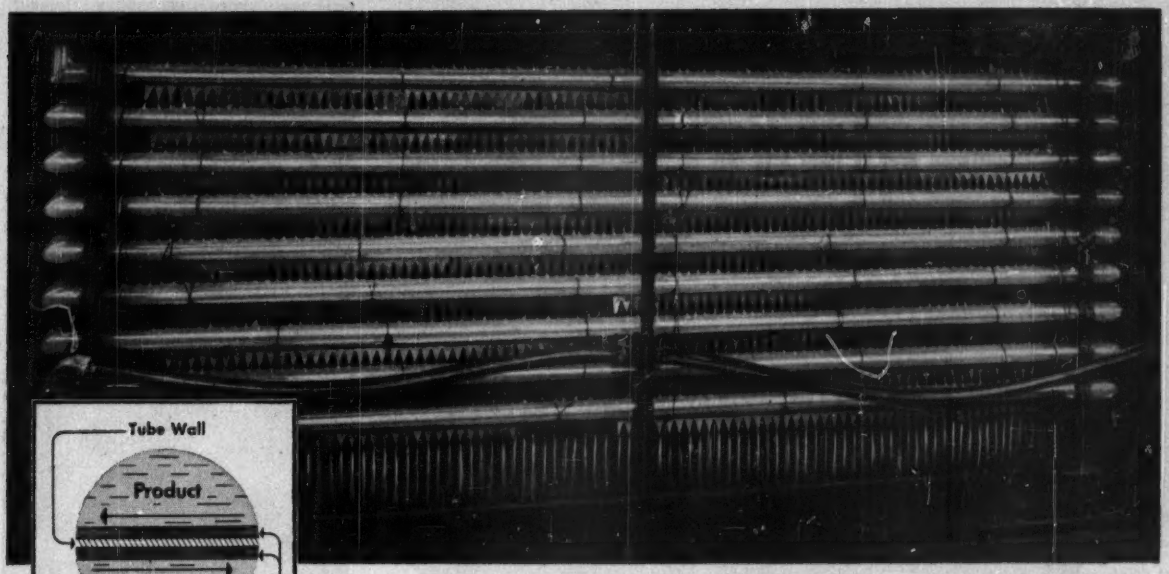
STAINLESS STEEL
LEAD
WOOD
STEEL
Fabrication

O. G. KELLEY & CO.

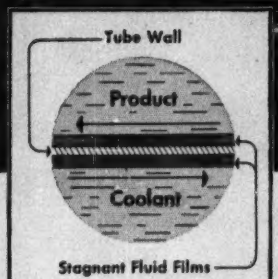
ENGINEERS DESIGNERS FABRICATORS

96 TAYLOR STREET, BOSTON 22, MASS

CLEVELAND, OHIO
HOUSTON, TEXAS
NEW YORK, N.Y.
JOHNSON CITY, TENN.
PITTSBURGH, PA.
ELIZABETH, N.J.



PYREX CASCADE COOLER assembled of 18 standard 10-foot lengths of 2" PYREX heat exchanger pipe, arranged in two banks with standard PYREX U-bends at John Wiley Jones Company plant, Beech Grove, Ind. (Indianapolis). 15% solution of sodium hypochlorite bleach is circulated through the cooler at 35 GPM, under approximately 45 psi.



One of the causes of heat transfer resistance is the stagnant fluid films next to tube walls (shown), not the walls themselves. Thermal conductivity of tube itself is of small importance. But because PYREX pipe is "glass smooth," it resists scale formation which impedes heat flow.

One Pyrex® cascade cooler

saves 8 to 10 hours on every batch

Here's why it will pay you to check your present methods of manufacturing and processing chemicals and pharmaceuticals.

John Wiley Jones Company, manufacturer of "Sunny Sol" household bleach did just that. Now they save 8 to 10 man-hours on every 750-gal. batch of 15% sodium hypochlorite bleach. They did it by replacing previous equipment with one PYREX brand Cascade Cooler.

Because this installation at its Beech Grove, Ind. (Indianapolis) plant has proved so successful, the John Wiley Jones Company plans similar installations of PYREX Cascade Coolers in its other plants.

In this process, chlorine is absorbed into a 76% solution of sodium hydroxide as fast as possible, while the temperature of the solution is held below 85° F. Approximately 500,000 BTU (67,000 BTU per 100 gal.) must be dissipated through the PYREX Cascade Cooler while the 750-gal. batch is being chlorinated to a concentration of 15% sodium hypochlorite. Average time for this processing is about 3½ hours.

In addition to economical heat transfer efficiency PYREX Cascade Coolers offer exceptional resistance to virtually all acids (except hydrofluoric) and mild alkalies. This over-all corrosion resistance protects sensitive products and permits the use of low-cost river or sea water as a coolant.

Through transparent glass, you can watch the flow and easily detect air locks or other impediments. The hard, smooth surfaces clean easily; dust and scale yield quickly to a weak acid poured through the tubes. High physical and thermal strength of the glass itself minimize breakage.

PYREX Cascade Cooler units come completely packaged and can be installed in a day or less. To save space you can mount them on floor, wall or ceiling.

The coupon will bring you a wealth of helpful information on PYREX brand Cascade Coolers, Pipe, Fractionating Columns and other plant equipment. Mail it today.

Corning Glass Works
Dept. CE-7, Corning, New York

Please send me the printed information checked below:

- ☐ "PYREX brand Glass Pipe in the Process Industries" (EA-1)
- ☐ "PYREX brand 'Double-Tough' Glass Pipe and Fittings" (EA-3)
- ☐ "Plant Equipment Glassware for Process Industries" (EB-1)
- ☐ "Installation Manual" for PYREX brand "Double-Tough" Glass Pipe-(PE-3)
- ☐ "PYREX Cascade Coolers" (PE-8)

Name.....
Title.....
Company.....
Street.....
City.....
Zone.....State.....

Corning means research in Glass

DICALITE
Research and Development Work has *never* stopped

ABOVE—This enlarged photo is a view looking at the edge of the new Fiberglas battery separator. On the right is the main portion made of a composition containing Dicalite, which affords two important advantages: extreme resistance to the acid, and high porosity. The special structure including the layers of glass fibers on each side, affords good strength and allows much more free circulation of the battery acid.

Dicalite's "inquiring mind"—with laboratories for tools—searches constantly for new and better ways in which Dicalite can serve industry. Even during the recent period when diatomaceous materials were in critically short supply, Dicalite steadily continued the research which had already made many contributions to industrial processing.

Look at the brand-new product pictured here—developed by Owens-Corning Fiberglas Corporation. It is a battery separator, made of Fiberglas, in which Dicalite serves so well as the filler because of its unique physical characteristics. This new product promises longer life for car and industrial batteries, since it is completely insoluble in battery acids. Dicalite engineers worked with the technical staff of the manufacturer, who is now using a specially selected Dicalite material which is a vital part of the separator composition.

The problem may just as well have concerned filtration, insulation, or any other Dicalite application. Constant research and development work is one strong reason why Dicalite can serve you better, not only in variety and quality of products but in dependability as well. Perhaps you have a problem or project where this service may be helpful. A Dicalite engineer will gladly call at your request.

By the way, have you seen the feature article, "Diatomaceous Earth," on Dicalite operations and applications in the February issue of Industrial and Engineering Chemistry? Write today for your copy of our free reprint to Dept. C-57, Dicalite Division.

Dependable GREAT LAKES **Dicalite®** DIATOMACEOUS MATERIALS

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION • NEW YORK 17 • CHICAGO 1 • LOS ANGELES 17

SIMPLE and EASY TO USE

Midwest Reducing Elbow replaces two fittings (1) a straight size elbow and (2) a reducer. One weld is eliminated with a resultant saving in layout time, welding, and cost. Pressure drop is reduced, appearance is improved and the piping is easier to insulate. Sizes to 12", reductions to half size.

Children get the hang of a bubble pipe almost by instinct . . . it's so simple and easy to use. Pipe welders report that they find Midwest Welding Fittings simple and easy to use because they are so uniform . . . so accurate to dimension . . . and because of their greater variety. Representative of this greater variety is the Midwest Reducing Elbow (shown at right) which takes the place of a standard elbow and a reducer . . . requires only two welds instead of three. For more information on why Midwest Welding Fittings are simple and easy to use, ask for Catalog 48.

MIDWEST PIPING COMPANY, INC.
Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic, Los Angeles and Boston
Sales Offices:
New York 7—50 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave.
Tulsa 3—224 Wright Bldg. • Boston 27—426 First St.
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

MIDWEST WELDING FITTINGS

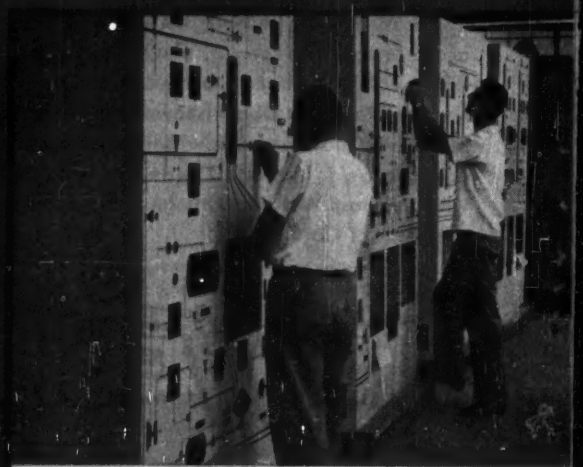
MIDWEST
WELDING FITTINGS
Improve Piping Design and Reduce Costs

OPERATOR'S JOB IS EASIER when he has this convenient panel at his service. This board is just one section of a large control center, from which an intricate process is regulated.

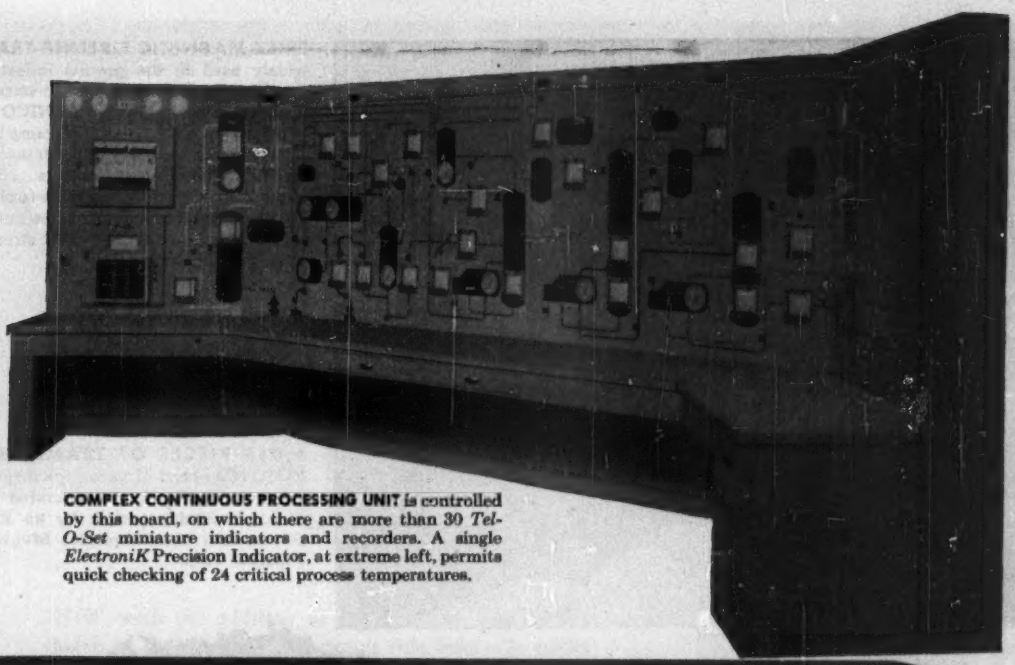
Graphic Panels for modern process control...

These companies . . . and many more
use Honeywell Graphic Panels

Bechtel Corporation
C. F. Braun
Canadian Oil Refineries
Catalytic Construction Co.
Cooperative Refinery Association
Day & Zimmerman Inc.
Derby Oil Co.
Farmers Union Central Exchange Refinery Inc.
The Fluor Corporation Ltd.
Foster Wheeler Corp.
Great Lakes Refinery
Imperial Oil of Canada
Inter-Mountain Chemical
International Refineries, Inc.
Kanotex Refining Co.
The Lummus Co.
Northwestern Refinery
Pan-Am Southern
Phillips Petroleum Co.
The Refinery Engineering Co.
Rohm & Haas Co.
Shell Oil Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co.
Southwestern Engineering Co.
Standard Oil Co. of California
Standard Oil Co. of Indiana
Standard Oil Co. of New Jersey
Sunray Oil Corp.
Sutherland Refiner Corp.
Union Oil Co. of California
Vickers Petroleum



HONEYWELL PANEL DIVISION includes complete panel assembly facilities. All instruments, controllers, accessories, and back-of-panel wiring and piping are carefully assembled—then subjected to rigorous tests which simulate actual process conditions, to assure trouble-free start-up on the job.



COMPLEX CONTINUOUS PROCESSING UNIT is controlled by this board, on which there are more than 30 *Tel-O-Set* miniature indicators and recorders. A single *ElectroniK* Precision Indicator, at extreme left, permits quick checking of 24 critical process temperatures.

a progress report from Honeywell

THROUGH centralized graphic instrumentation by Honeywell, many companies are realizing the dollars-and-cents benefits of greater operating efficiency, simplified supervision, and improved coordination of complex processes. The panels shown on these pages typify the many which Honeywell has supplied for a variety of applications.

Into each panel—large or small—goes a wealth of specialized engineering experience, which translates process requirements into a coordinated design. Attractive appearance is combined with functional arrangement of every part for maximum operating convenience and efficiency.

Superior workmanship is the hallmark of Honeywell panels. Skilled technicians use special techniques to produce completely wired and assembled boards, in a separate manufacturing division devoted exclusively to panel work.

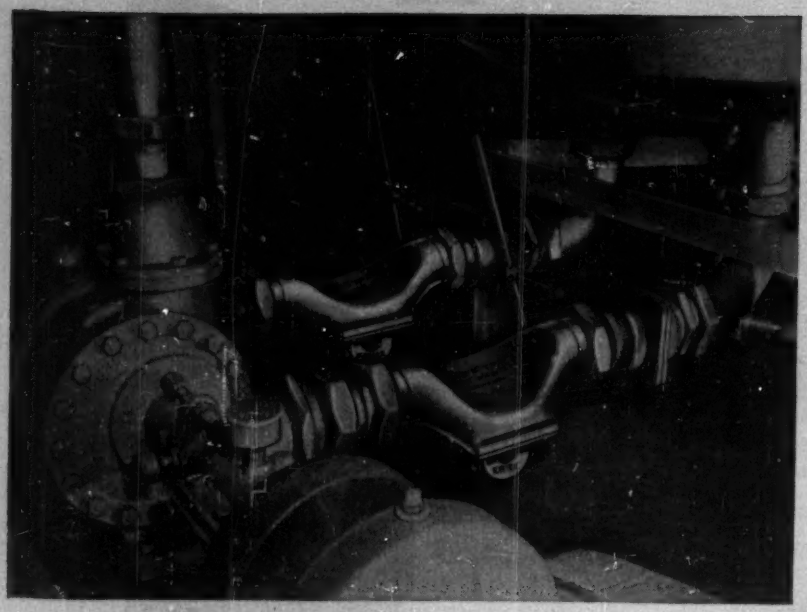
Drawing upon the most complete line of conventional and miniature instruments, Honeywell is prepared to develop the centralized control your process needs . . . whether it be a full graphic, semi-graphic or conventional panel—a control cubicle or a complete control room.

Our local engineering representative will be glad to discuss how *Panels by Honeywell* can help your process. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4478 Wayne Ave., Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for reprint of article "Centralized Graphic Panels—Unlimited," *Instrumentation*, Vol. 6, No. 1

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls



ERIEZ MAGNETIC PIPELINE TRAPS, widely used in the process industries, provide the superior magnetic strength of a high nickel alloy . . . ALNICO . . . to assure positive trapping of tramp iron. Housings are non-magnetic chromium-nickel stainless steel castings . . . leak-proof, easy to install and simple to clean. Completely non-electric . . . first cost is last cost . . . since magnets hold strength during life of equipment.

1,045 PIECES OF TRAMP IRON REMOVED ahead of vane-type displacement pump in food production line during a 30-day period, by an ERIEZ Permanent (non-electric) Magnetic Pipeline Trap.

Prevent

→ *Machinery Damage*

→ *Product Contamination*

→ *Production Tie-Ups*

. . . Automatically, with Eriez Magnetic Traps

Look at this pile of tramp iron . . .

Trapped ahead of a pump in a large food plant during a 30-day processing period . . . it exemplifies how "protection plus" is obtained automatically with pipeline traps produced by ERIEZ MANUFACTURING COMPANY, Erie, Pa.

To keep liquid flow lines free of ferrous materials ranging in size from minute particles to large pieces of tramp iron, ERIEZ pipeline traps utilize the strong magnetic properties of Alnico permanent magnets containing a high percentage of nickel.

Use of this aluminum-nickel-cobalt-iron alloy not only permits trap designs that eliminate need for electromagnets requiring current and accessory equipment, but its use also allows reduction of space and weight requirements to desirable limits.

The addition of nickel . . . an essential in Alnico . . . improves scores of other alloys utilized throughout industry. Consult us on use of nickel or nickel alloys in your products or equipment.

Send details of your metal problems for our suggestions.

At the present time, nickel is available for end uses in defense and defense supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.

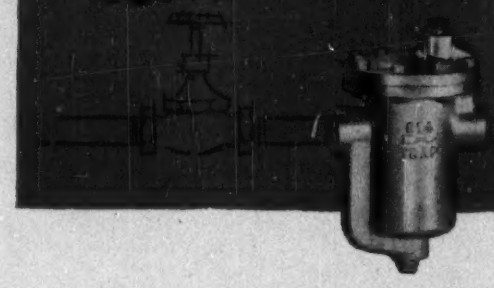
EMBLEM OF INCO SERVICE

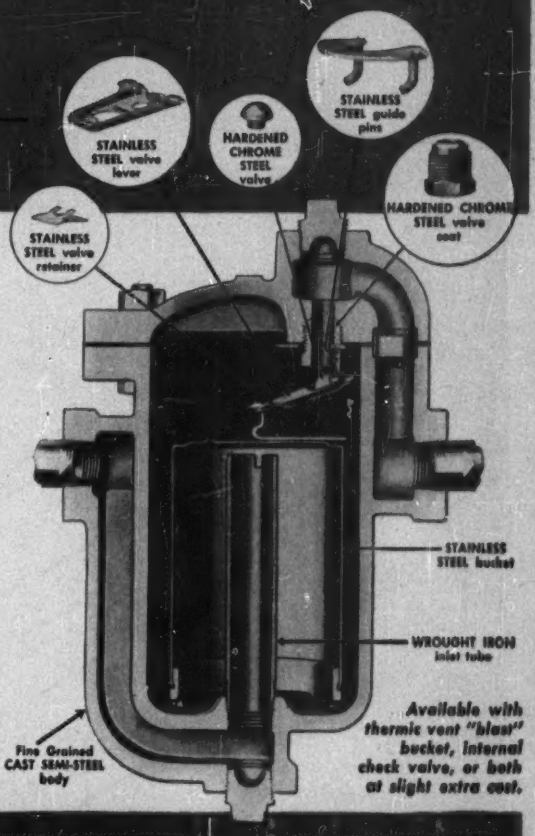
THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

NEW

ARMSTRONG No. 814

. . . a side inlet-side outlet steam trap with 1" or 1¼" pipe connections!




STAINLESS STEEL valve lever
HARDENED CHROME STEEL valve
STAINLESS STEEL guide pins
HARDENED CHROME STEEL valve seat
STAINLESS STEEL valve retainer
STAINLESS STEEL bucket
WROUGHT IRON inlet tube
Fine Grained CAST SEMI-STEEL body

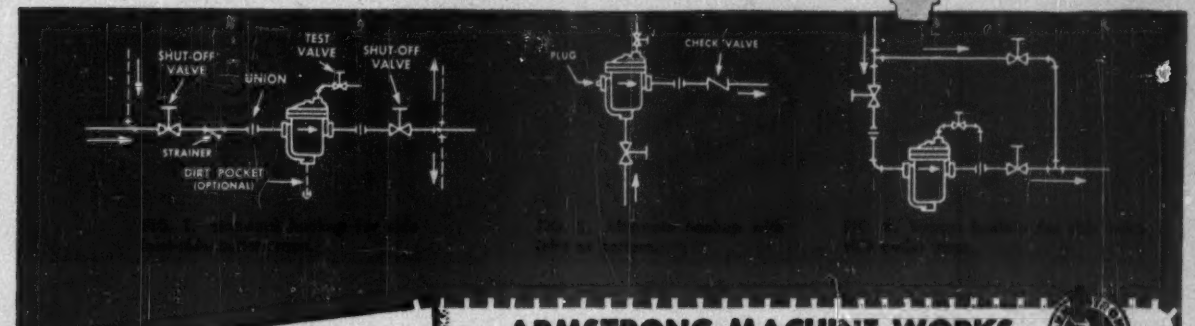
Available with thermic vent "blast" bucket, internal check valve, or both at slight extra cost.

NOW, with the addition of the No. 814, you have a choice of five sizes of Armstrong side inlet-side outlet traps from ½" to 1¼" for use wherever horizontal and opposite pipe connections will make the simplest hookups. Bottom inlet-top outlet traps are available in the same size range, so that for the majority of all condensate loads you can use the body style that best suits the job.

Capacity of the new No. 814 is 6500 lbs./hr. at 125 psig.; height 13⅝"; face to face dimension 8"; weight 45 lbs.; price $46.00 list.

For complete data on the No. 814 and other Armstrong traps, call your Armstrong Representative or mail the coupon today.

ARMSTRONG MACHINE WORKS
858 Maple St., Three Rivers, Mich.



HOW TO ORDER:

Refer to Armstrong Catalog J, Sweets' Plant Engineering or Industrial Construction Files or Chemical Engineering Catalog. Capacities of the 814 are identical to the 214 trap listed in these Catalogs. Other data are given above. Specify trap number, pipe connections and maximum operating pressure.

ARMSTRONG MACHINE WORKS
858 Maple St., Three Rivers, Mich.

- ☐ Send complete data on No. 814 trap.
- ☐ Send Catalog J listing all Armstrong traps.
- ☐ Have Representative call.

Name_____

Company_____

Street Address_____

City_____ Zone____ State_____

JENKINS PRACTICAL PIPING LAYOUT 67

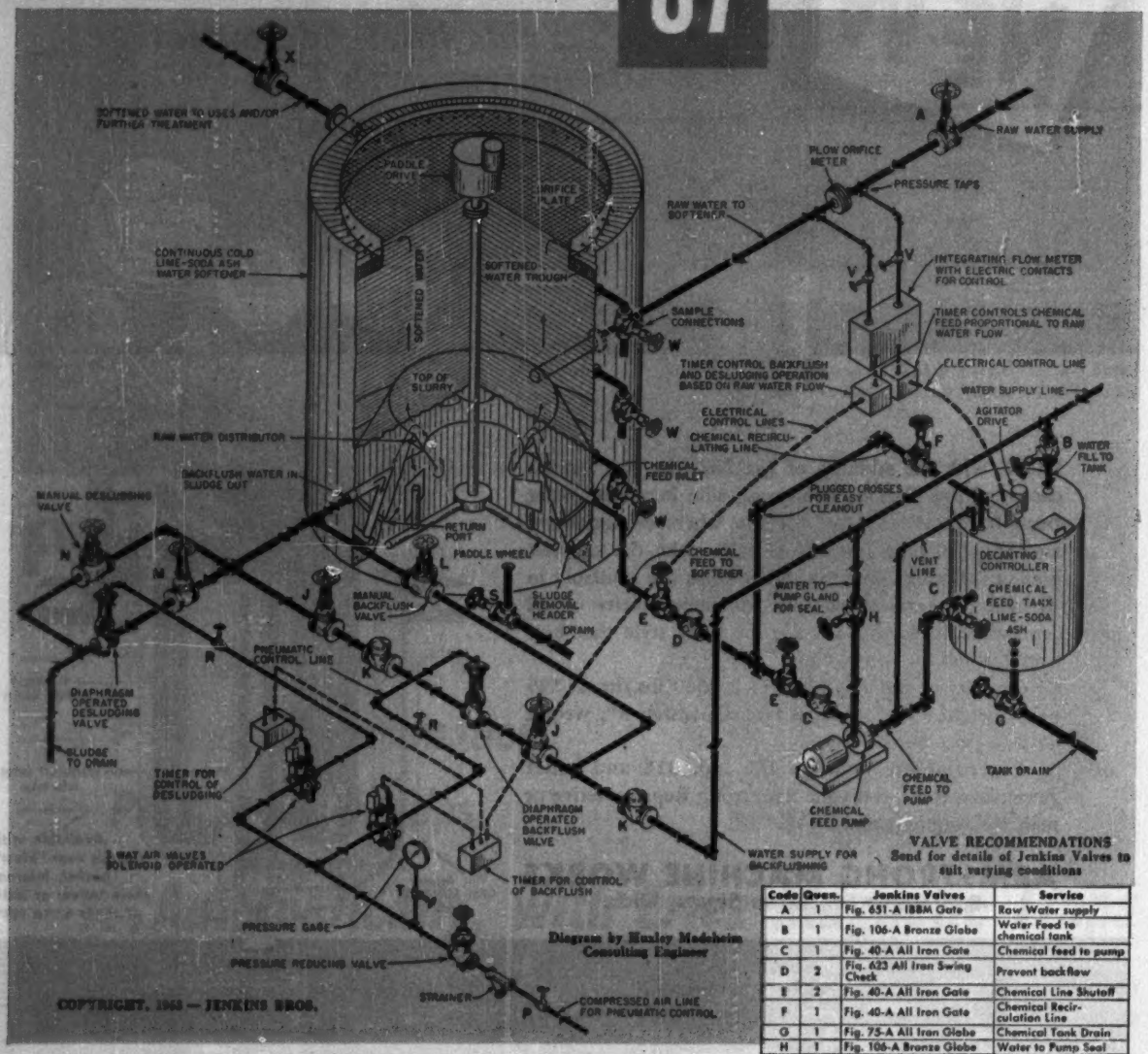


Diagram by Manley Modcheim Consulting Engineer

VALVE RECOMMENDATIONS
Send for details of Jenkins Valves to suit varying conditions

Code	Quan.	Jenkins Valves	Service
A	1	Fig. 651-A IBBM Gate	Raw Water supply
B	1	Fig. 106-A Bronze Globe	Water Feed to chemical tank
C	1	Fig. 40-A All Iron Gate	Chemical feed to pump
D	2	Fig. 623 All Iron Swing Check	Prevent backflow
E	2	Fig. 40-A All Iron Gate	Chemical Line Shutoff
F	1	Fig. 40-A All Iron Gate	Chemical Recirculation Line
G	1	Fig. 75-A All Iron Globe	Chemical Tank Drain
H	1	Fig. 106-A Bronze Globe	Water to Pump Seal
J	2	Fig. 651-A IBBM Gate	Backflush Valve Shutoff
K	2	Fig. 624 IBBM Swing Check	Prevent Backflow
L	1	Fig. 142 IBBM Globe	Manual Backflush Valve
M	1	Fig. 651-A IBBM Gate	Desludge Valve Shutoff
N	1	Fig. 142 IBBM Globe	Manual Desludge Control
P	1	Fig. 106-A Bronze Globe	Compressed Air Line Shutoff
R	2	Fig. 106-A Bronze Globe	Pneumatic Control Line Shutoffs
S	1	Fig. 100 All Iron Gate	Softener Tank Drain
T	1	Fig. 741-G Bronze Needle	Pressure Gage Control
V	2	Fig. 741-G Bronze Needle	Flowmeter Pressure Tap Shutoffs
W	3	Fig. 75-A All Iron Globe	Sample Takeoffs

How to plan a CONTINUOUS COLD LIME-SODA ASH WATER SOFTENING SYSTEM

A common method of softening water by removing calcium and magnesium salts, the cold lime-soda ash process is now employed in virtually every major industry. Depending on plant requirements, it can be installed to operate as a batch-process or continuous-process system.

The continuous-process system is illustrated. As raw water combines with a lime-soda ash solution pumped from the chemical feed system, microscopic particles form and mix with coagulated precipitate in the tank.

In constant circulation, the mixture of water and precipitate first rises through the mixing zone, then flows down around the outside cone to reenter the mixing zone via a return port. A small portion rises through the slurry to the top and enters the softened water trough for further treatment or use. Larger, denser masses of precipitate drop down to be removed by the desludging system, which automatically loosens up the compacted sludge and drains it off for a predetermined length of time.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of lowest cost in the long run. Jenkins Bros., 100 Park Ave., New York 17.

Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 67.

JENKINS VALVES
LOOK FOR THE DIAMOND MARK
Jenkins Bros.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

Change in Cooking Agents Solves Pollution Problem

What is termed by its authors as the "complete answer" to the problem of stream pollution by pulpmill wastes was revealed at a recent technical society meeting. The new process hinges about the use of magnesium bisulfite as the cooking agent in woodpulp production instead of the present calcium bisulfite. In this way, the digester residual liquor (the crux of the present problem) can be satisfactorily evaporated and disposed of by burning. Chemicals can be recovered and used again, and heat from the combustion of the organic matter can be used for the efficient generation of steam and power.

Experiences with a commercial mill set up to study and use the process are said to have definitely established the economic soundness of the idea.

Wounds Show Affinity for S^{35} from Tagged Methionine

Results of recent research with methionine, tagged with radioactive sulfur (S^{35}), are seen as further positive proof that methionine is involved in the healing of wounded tissue. By injecting radioactive methionine into wounded rats, investigators were able to follow the course of the S^{35} through the body. Within five days of injection, they found twice as much radioactive sulfur in regenerating wound tissue as in normal unwounded skin tissue. This concentration continued to increase, with the rate of increase corresponding to the rate at which the wound healed.

Analysis showed most of the radioactive sulfur in the wound tissue to be associated with cystine. In addition, there was more cystine in the wound tissue than in normal tissue. This indicates that scar tissue produced during wound healing is different from normal tissue protein. The experiments showed that most of the sulfur in the regenerating tissue was supplied from the tagged methionine.

Al-Sb New Semiconductor

Scientists recently reported the development of a new low-cost compound of aluminum and antimony which they think may one day compete with germanium and silicon as a semiconductor for transistors, rectifiers, and other electronic devices. The compound is one of a number of combinations of aluminum, gallium, and indium with arsenic and antimony now being investigated for possible uses.

The researchers explain that aluminum-antimony has essentially the same diamond-like structure as silicon and germanium. Work to date has shown that the material can be used to convert light to electrical energy, suggesting its possible use in photo-electric cells. Rectifiers have been made in the laboratory with the material, and transistors are said to be a distinct possibility in the future.

Aroflat Alkyds Found Superior In Controlling Paint Consistency Over All Temperature Changes

Low-Temperature Studies of Viscosity Changes Show Aroflat 3025 And 3050 Unique in Keeping Alkyd Flats Brushable at All Practical Painting Temperatures; Film Properties Also Improved

The solution to an important problem encountered by both manufacturers and users of interior flat paints is seen in data recently made available on viscosity-temperature changes of alkyd-type flat paints and their resin ingredients.

The now common practice of finishing interiors at all seasons of the year, together with the rapid growth in preference for alkyd finishes, has made the relationship between temperature and viscosity in these paints an important consideration. Now, a paint's brushing characteristics and other properties during *cold and warm weather* conditions are as important to its over-all satisfactory performance as its behavior at *normal* temperatures.

Consistency Change Factor the Criterion

The most important change that occurs in alkyd flat paints as the temperature drops is an increase in viscosity. If the viscosity changes rapidly with temperature, the paint is said to have a large "consistency change factor." In a cool atmosphere, such a paint becomes thick, ropey, and difficult or impossible to brush without considerable thinning. And thinning, in turn, reduces the non-penetrating and non-ghosting properties (sheen and color uniformity) of the paint. Temporarily heating the room with space heaters can be resorted to, but practical paint technicians are quick to point out that this does not appreciably heat the wall surfaces. Since paint is applied in a thin film, it cools almost instantaneously on a cold wall, regardless of its temperature in the can. If the paint has a large consistency change factor, it will be almost as difficult to apply as in an unheated room.

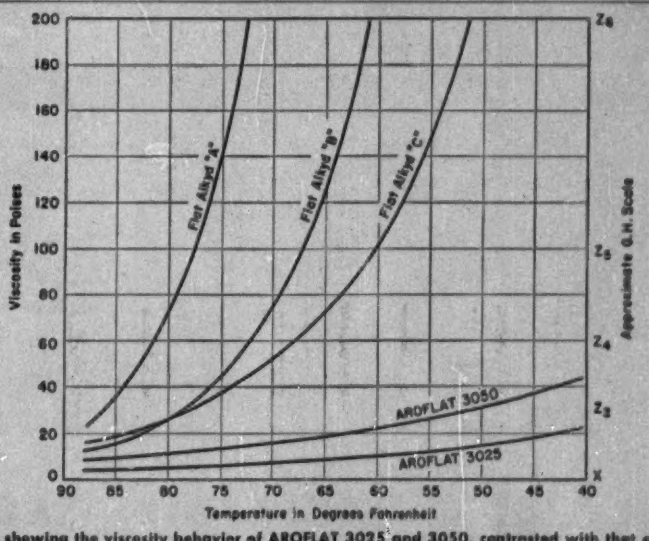
AROFLAT Alkyds Furnish the Answer

In pioneering alkyd resins for better flat and semi-gloss wall finishes, U.S.I. laboratories were aware of these viscosity problems and developed AROFLAT alkyds with unique and inherent qualities to overcome them. Data demonstrating the low consistency change factors imparted to paints by these resins was obtained recently in an independent study which paint manufacturers can verify easily in their own laboratories.

Resin Viscosities Compared

In this study, viscosity determinations were made on various resins at temperatures within and beyond the range likely to be encountered in year-around decorating. U.S.I.'s AROFLAT

MORE



Curves showing the viscosity behavior of AROFLAT 3025 and 3050, contrasted with that of three conventional-type alkyds, as the temperature decreases from 90° to 40° F. The steep curves of the conventional flat alkyd resins mean that paint formulations containing them will be difficult or impossible to brush in cool weather, or after they have been stored in a cool place.

U.S.I. CHEMICAL NEWS

CONTINUED

Viscosity Studies

3025 and AROFLAT 3050 were included, as well as a number of conventional alkyd resin solutions of other companies. All of the resins were tested in the form in which they are offered to paint manufacturers.

The paint on the right is formulated with AROFLAT 3025, that on the left is a commercial flat containing a conventional alkyd. Both were held at 40° F. prior to this demonstration.

Representative curves showing how the viscosities of these resins changed with temperature are plotted below. The flat curves of the AROFLAT resins over the full temperature range offer a sharp contrast to the steep curves of three conventional alkyds, all of which are incorporated in flat paints now on the market.

Paints Show Same Effect

Further tests showed that the viscosity characteristics of these resins carried over into their respective paint formulations. For example, in a comparison of finished paints, all with consistencies of 80-81 Krebs units at 78° F., the AROFLAT formulations increased to only 86-88 units when the temperature was lowered to 63°. Over the same temperature drop, consistencies of conventional alkyd paints jumped to 140 units or more. Most authorities agree that paints with consistencies greater than 100 Krebs units are too thick to apply satisfactorily.

Film Properties Also Affected

Tests on the films of these paints at reduced temperatures, as well as at prolonged elevated temperatures, showed that they lose flexibility in a comparable manner to their sharp consistency changes. Films of AROFLAT paints applied to Morest charts remained flexible at both extremes of temperature while those of conventional paints cracked when the Morest charts were folded.

AROFLATS Yield Fool-Proof Paints

To the paint manufacturer, the results of these tests mean that with the AROFLATS he can formulate his paints to be much more "fool-proof." U.S.I. technicians point out that spring and autumn seasons bring sufficient temperature changes to produce application difficulties. While the summer ahead supplies temporary relief, now is the time to correct any fundamental faults so that stocks on dealers' shelves will not be a source of future trouble during cool weather.

New Rub Test Instrument Seen Aiding Ink Research

Rub-resistance, the property of an ink which preserves the sharp, clean appearance of printed matter throughout its useful life, is becoming more and more important, particularly in the packaging field. To fill the need for a standard test of this property, an independent research organization recently announced the development of what it describes as a new and better portable rub tester.

The characteristic motion of the instrument is planetary, i.e., a one and one-half inch square piece of paper or print is rubbed in a circle at 25 rpm over the print under test while the square piece undergoes a slow rotation of its own. Three pressures are available, and the machine can be set to turn off automatically after 1 to 50 cycles. Test conditions are entirely reproducible, directional effects of the stock are averaged, and the instrument eliminates streaks and deep gouges, it is claimed.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U. S. I.

Gluing operations in confined spaces and on small objects are said to be easier with a line of adhesives now packaged in collapsible tubes with hypodermic needle tips. Adhesives are nitrocellulose, vinyl, and rubber types. **(No. 930)**

The flat, non-divergent, knife-like ribbon of air, water, or steam emitted by a new cleaning nozzle makes it suitable for descaling, de-barking wood, cleaning buildings and equipment, and many other uses, according to the manufacturer. **(No. 931)**

A new chemical resistant lab coat, made of lightweight vinyl fabric, is claimed to be virtually immune to spotting and acid holes, to outlast ordinary lab coats many times, and to retain a neatly tailored appearance through hard wear and launderings. **(No. 932)**

For stabilizing latex emulsion paints, a new dry-form casein has been announced which dissolves easily at the point of use, provides improved viscosity, brushability, mechanical ability, and helps prevent hardening of paint pigments. **(No. 933)**

New stainless steel-vinyl plastic coatings, now available in all colors, are said to be impervious to moisture, resistant to most chemicals, quick-drying, and capable of withstanding constant dry heat up to 300° F. **(No. 934)**

Clear, clean ice flakes, freed of sediment and trapped gases, can now be made directly in the laboratory with a fully automatic machine which produces up to 300 pounds of ice daily. Ice is said to remain flaky for days if kept in an insulated bin. **(No. 935)**

A new molybdenum-base lubricant in the form of an enamel can be applied "on any type of surface including plastics, glass, and ceramics" to yield a thin, hard coating which is greasy-feeling but clean, the manufacturer states. **(No. 936)**

Spot determinations of pH to within one-half a unit over the full pH scale can be made, it is claimed, with a series of six new indicator papers with color scales printed on the containers. **(No. 937)**

A new fire blanket for labs and homes is made of plastic-coated glass cloth, weighs two and one-half pounds, is resistant to acids, alkalies, and most solvents, and stays flexible in below zero temperatures. **(No. 938)**

New plastic acoustical ceiling tile, lined with fiber glass, is said to be easy to apply by the home owner or industry, to be easily cleaned, and to be stain-, peel-, and chip-proof. **(No. 939)**

PRODUCTS OF U. S. I.

ALCOHOLS
Amyl Alcohol (Isoamyl Alcohol)
Butanol (Normal-Butyl Alcohol)
Fusel Oil—Refined
Propanol (Normal-Propyl Alcohol)

Ethanol (Ethyl Alcohol)
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof U.S.P., Absolute—200 Proof
Solox*—proprietary solvent—regular and anhydrous

ANTI-FREEZE
Super Pyro* Anti-Freeze
U.S.I. Permanent Anti-Freeze

ETHERS
Ethyl Ether, U.S.P.
Ethyl Ether, Absolute—A.C.S.

ACETONE—A.C.S.

ANSOLS
Ansol* M
Ansol* PR

ACETIC ESTERS
Amyl Acetate—Commercial and High Test
Butyl Acetate
Ethyl Acetate—all grades
Normal-Propyl Acetate

OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate

PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS
Diatol*
Diethyl Carbonate
Ethyl Chloroformate

RESINS (Synthetic and Natural)
Arochem*—modified types
Arodure*—urea-formaldehyde resins
Arofene*—pure phenolics
Aroflat*—for special flat finishes
Aroflint*—room temperature curing phenolic
Aroplaz*—alkyds and allied materials
Aropol*—copolymer modified alkyds
Ester Gums—all types
Natural Resins—all standard grades

INSECTICIDE MATERIALS
Allethrin
CPR Concentrates: Liquid & Dust
Piperonyl Butoxide
Piperonyl Cyclonene
Pyrenone* Concentrates: Liquid & Dust
Pyrethrum Products: Liquid and Dust
Rotenone Products: Liquid and Dust

INSECTIFUGE MATERIALS
Indalone*
Tripla-Mix Repellents

INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate

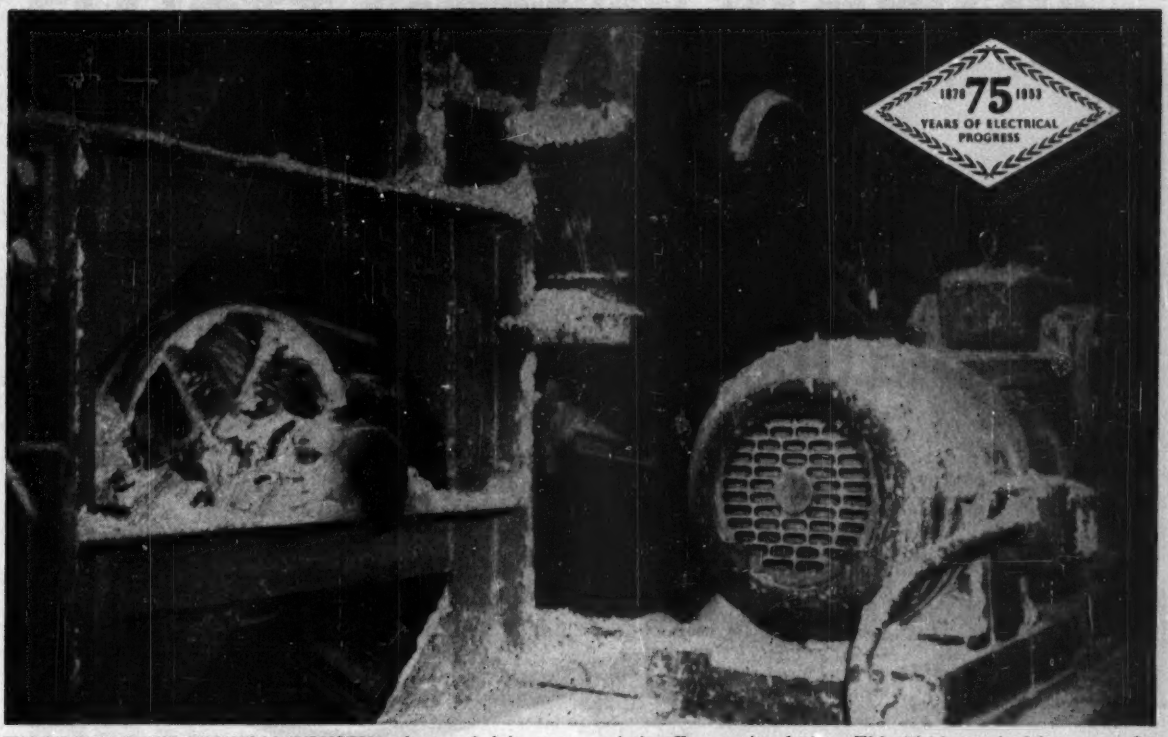
FEED PRODUCTS
Calcium Pantothenate (Feed Grade)
Choline Chloride
Curbay B-G*
DL-Methionine (Feed Grade)
Niacin, U.S.P.
Riboflavin Concentrates
Special Liquid Curbay*
U.S.I. Vitamin B_{12} and Antibiotic Feed Supplements
Vacatone* 40

OTHER PRODUCTS
Acetaldehyde
Caustic Soda
Ethylene
IPC (Isopropyl-N-Phenyl Carbamate)
CIFC
Liquid Chlorine
Metallic Sodium
Methionine (Pharm.)
Nitrocellulose Solns.
Propionaldehyde
Propionic Acid
Sulfuric Acid
Urethan, U.S.P.

*Reg. U.S. Pat. Off.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corporation

120 BROADWAY, NEW YORK 5, N. Y. BRANCHES IN ALL PRINCIPAL CITIES



THROUGHOUT THE CHEMICAL INDUSTRY, the tough jobs are done by General Electric Tri-Clad TEFC motors with corrosion-resisting Formex insulation. This 7½-hp unit drives a crude-ash conveyor an average of over 23 hours every day.

Field-tested insulation protects this true chemical motor against breakdowns

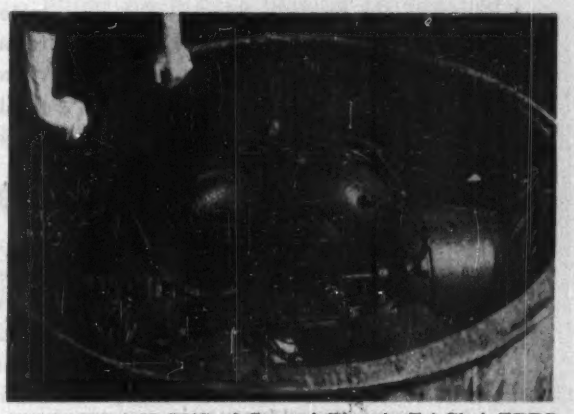
Only G-E standard Tri-Clad* TEFC motor has quadruple-Formex* insulated wire

One of many reasons why chemical plants have so widely accepted General Electric's standard Tri-Clad totally enclosed fan-cooled motor as *the* chemical motor is its superior insulation system, which stands up against moisture and corrosive fumes.

Quadruple-Formex insulated wire—finest insulated magnet wire available—is used for coil windings. Developed and licensed by G.E., this self-protecting wire is also coated with multiple dips and bakes of high-quality synthetic resin varnish and Glyptal* red bonding material. In addition, voltage-surge, salt-spray, and many other factory tests insure extra protection against motor breakdown.

For full data, ask your G-E Apparatus Sales representative or write for Bulletin GEA-4400 to General Electric Co., Sect. 662-42, Schenectady 5, N. Y.

*Registered trade-mark of General Electric Company.

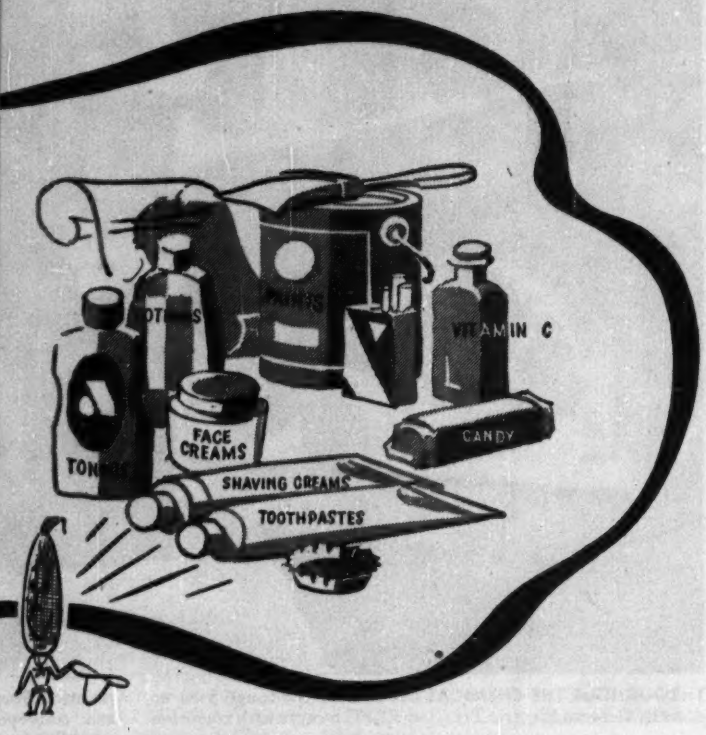


SIMULATED LIFE TEST of General Electric Tri-Clad TEFC motors in a salt-spray tank. This is one of several rigid tests that help assure dependability in chemical industry service.

You can put your confidence in—

GENERAL ELECTRIC

BUY POLYOLS ON FACTS



Sorbitol is the most versatile of polyols...

Sorbitol is the "polyol of a thousand uses." As a humectant, its low rate of moisture change makes it an ideal conditioning agent for cosmetics, tobacco, glue, foods, pharmaceuticals. As a chemical "starting material"—for making emulsifiers, detergents, finishes, resins, vitamin C, and many others—sorbitol offers chemical stability, wide compatibility, and high purity. Its ability to "solidify" perfume and flavor oils is another unique feature.

...and sorbitol costs less than ever before

Few products can match sorbitol's steady downward price history. Sorbitol actually costs less today than six years ago. This remarkable record has been accomplished through continued expansion and refinement of the efficient Atlas catalytic process of making sorbitol from abundant corn sugar and other sugars.

COMPARE BEFORE YOU BUY

. . . and choose the polyol that proves superior on *every* count. To help you utilize sorbitol's unique characteristics in your product, Atlas offers full technical information and service.

INDUSTRIAL CHEMICALS DEPARTMENT

ATLAS POWDER COMPANY

WILMINGTON 99, DELAWARE

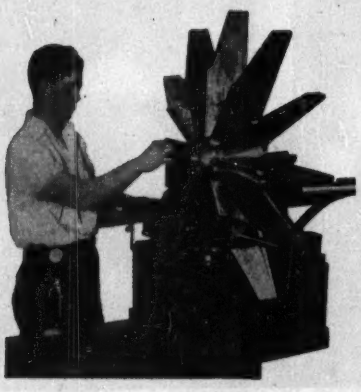
offices in principal cities

ATLAS POWDER COMPANY, CANADA, LTD.
BRANTFORD, CANADA

Write for your copy of this free booklet, "The Sorbitol Story."

ELLIOTT *Centrifugal* BLOWERS...

THEY TAKE BRINE-LADEN AIR AND LIKE IT!



The one-piece, open-type, radial bladed impeller is carefully balanced statically and dynamically.

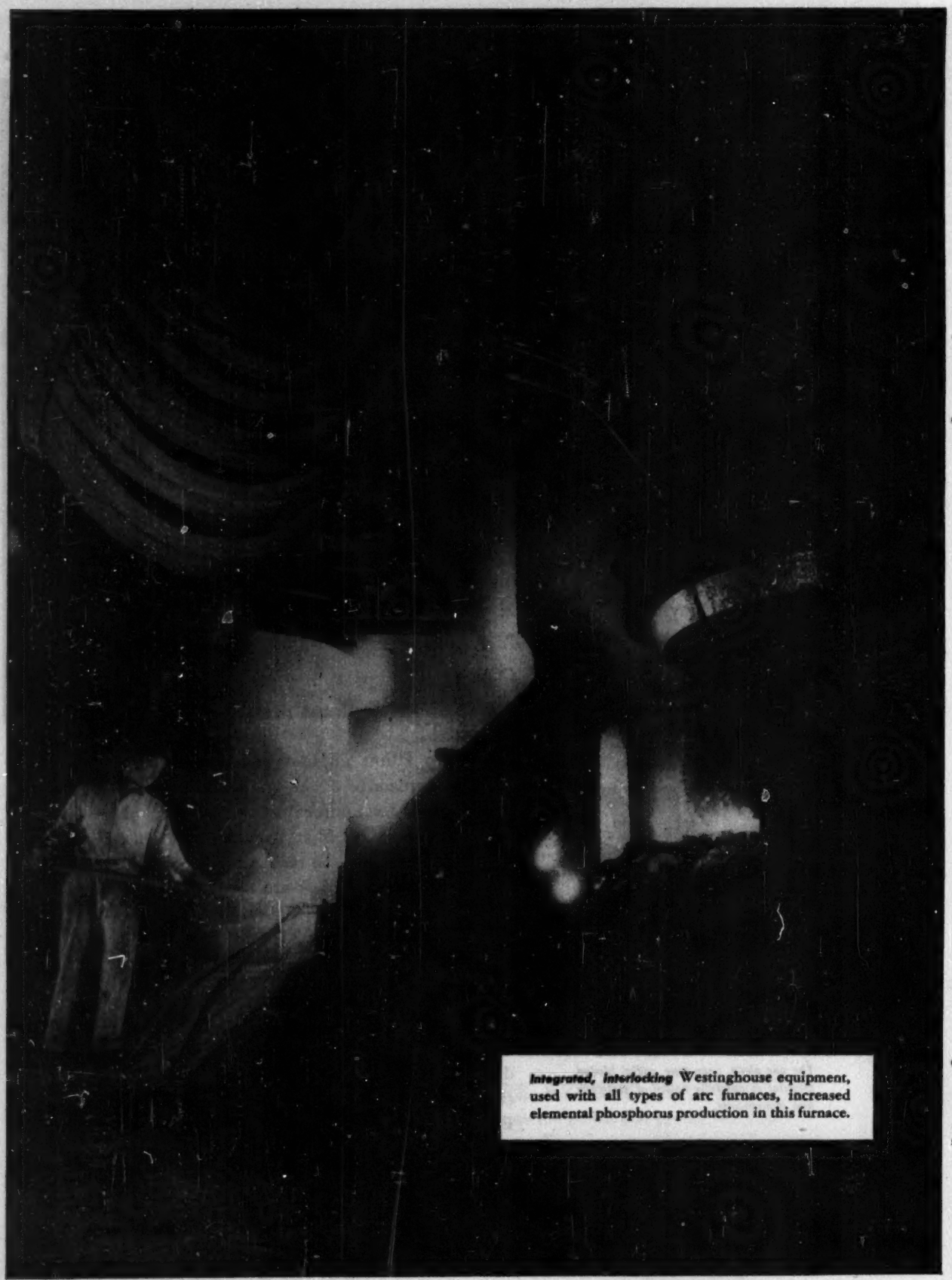
These two Elliott single-stage blowers are installed in the new plant of a well-known salt producer in a western state. Each unit exhausts 15,000 cfm of brine-laden air from a salt filter, compressing from 24.0 to 29.4 in. Hg absolute. To resist the corrosive action of the salt, special materials are used for the impeller, guide vanes, inlet connection and backplate.

The wide experience of Elliott engineers in applying centrifugal blowers to process needs, particularly where corrosive action must be met, has resulted in the selection of Elliott blowers for a preponderance of salt refinery applications, as well as for other difficult services. For full data on Elliott blowers, contact your local Elliott representative, or write Elliott Company, Jeannette, Pa.

ELLIOTT Company

CENTRIFUGAL BLOWER DEPARTMENT

PJ-1



Integrated, interlocking **Westinghouse equipment, used with all types of arc furnaces, increased elemental phosphorus production in this furnace.**

Westinghouse power package boosts arc furnace production

An integrated power package, applied to your arc furnace installation by Westinghouse engineers, can make production jump. One chemical company increased power efficiency 10% and boosted furnace capacity by using the Westinghouse equipment described below. In fact, a convincing number of chemical manufacturers could show you profit-making proof, because more furnaces today have Westinghouse equipment than all other makes combined.

Shell-form design strengthens transformers—To meet the trend toward higher voltages, Westinghouse offers its outstanding shell-form transformer... far stronger than the conventional core-form construction and more compact. It can stand the overloading and high stresses encountered in handling heavy current surges. Built for all ratings over 1500 kva, Westinghouse shell-form transformers have a fine record for low maintenance and service continuity.

Electrical brain moves electrodes—Another Westinghouse development—Rototrol®—maintains the desired power input. As furnace conditions change, Rototrol automatically and smoothly moves the electrodes up or down within the charge. It balances arc voltage and current to hold steady the input set by the operator. Rototrol acts fast and doesn't overshoot.

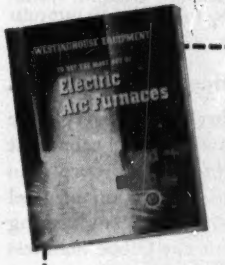
Maintenance men like this breaker—Westinghouse has designed two new hard-working air-blast circuit breakers that provide 500,000 kva interrupting capacity. They can withstand 15,000 operations without major maintenance—seven or eight times more than conventional oil-insulated breakers. Inspection and oil reconditioning every two or three weeks are no longer necessary.

Free booklet of arc furnace ideas—An informative, 20-page booklet, *Westinghouse Equipment for Arc Furnaces,* can spark ideas for your operation. Here's convincing evidence . . . facts, installation photos, technical data... to show that it's wise, when your next project comes up, to call your nearby Westinghouse representative. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94988

YOU CAN BE SURE...IF IT'S

Westinghouse



Westinghouse Electric Corporation
P. O. Box 868
Pittsburgh 30, Pennsylvania

Please send my free copy of B-4695, *Westinghouse Equipment for Arc Furnaces.*

Name_____

Company_____

Street_____

City_____ State_____

GLOBE Seamless
GLOWELD Welded

- **Resistance to Corrosion**
- **Strength at High Temperatures**
- **Resistance to Oxidation at High Temperatures**
- **Ease of Fabrication**

TYPICAL ANALYSES AND TYPES:

302	309S	316Cb	330	410
302B	309Cb	317	347	430
304	310	321	403	443
308	314	329	405	446
309	316	INCONEL * — NICHROME **		

**Registered U.S. Trade-Mark* ***Trade-Mark Reg. U.S. Pat. Off. D-H Co.*

Globe produces more than 26 standard analyses of stainless steel tubes — also special analyses when required. Because varying analyses have widely varying service characteristics, Globe will make recommendations only after careful study of your particular problem.

GLOBE

specialization...

meets your exact requirements in

STAINLESS STEEL TUBES

Write for Bulletin 333 — Corrosion and Heat Resisting Steel Analyses Chart — a valuable reference tabulation of stainless steel analyses as produced by various manufacturers.

SIZE RANGE:

Globe seamless stainless steel tubing may be had in sizes from ½ inch to 6 inches O.D., and in pipe sizes ⅛ inch to 6 inches, standard, extra strong and double extra strong weights.

Gloweld electric welded stainless steel tubing is available in sizes ranging from ¼ inch to 5 inches O.D. inclusive; in standard weight pipe (schedule 40) sizes ⅛ inch to 2 inches — lightweight pipe (schedule 5 and 10) ⅛ inch to 4½ inches inclusive.

TOLERANCE RANGE:

All stainless tubing furnished to standard A.S.T.M. specifications unless otherwise specified to suit your particular application requirements.

Piercing, rolling and reduction of seamless tubes is closely monitored from this control room — typical of the highly specialized equipment in the Globe mill.

Globe specialization gives you uniform high quality...

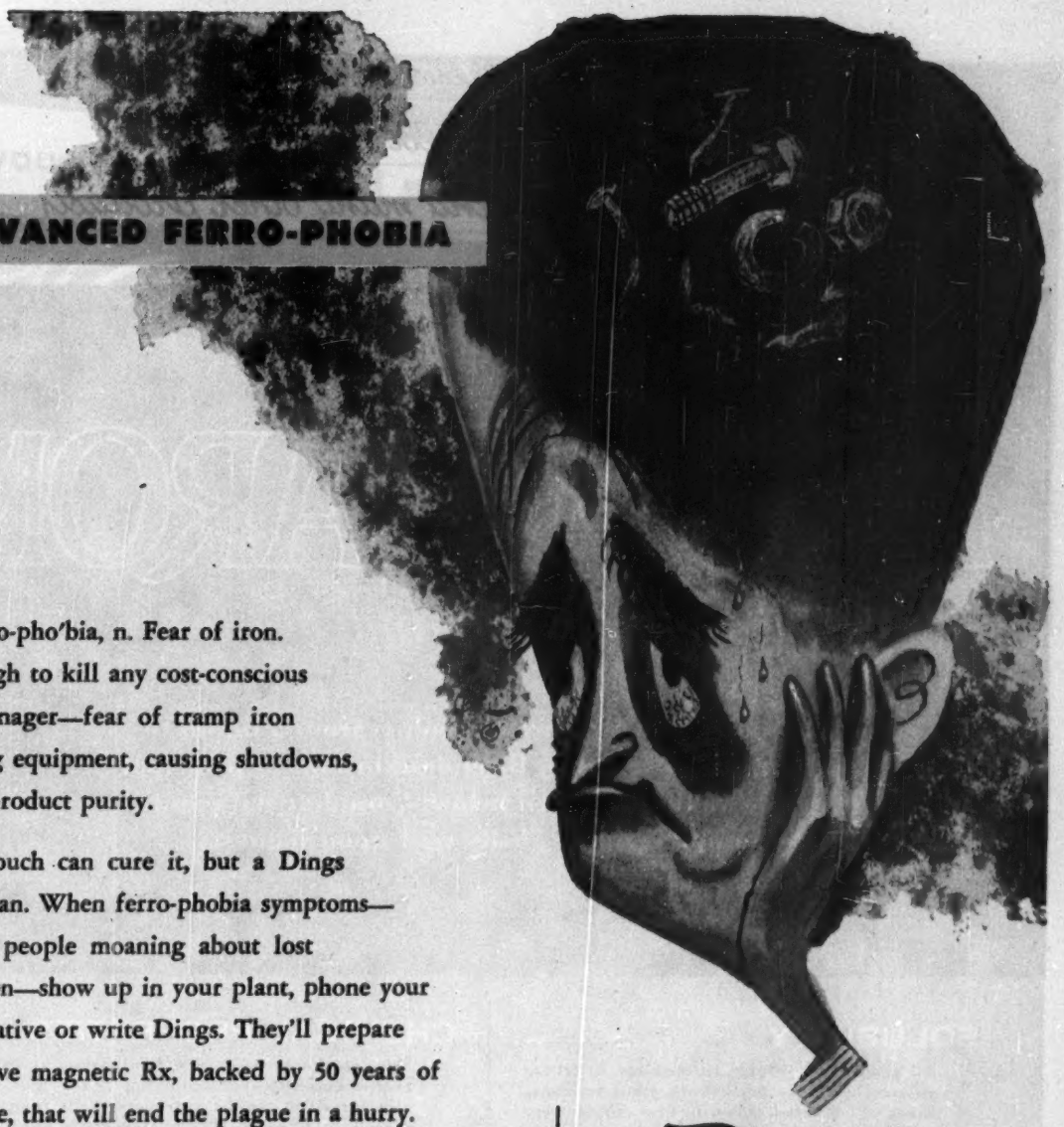
Precision checks — and re-checks — at every stage of production insure Globe stainless steel tubes that meet *your* exacting specifications. For more than thirty years, specialization in production of steel tubes has key-noted all Globe research, engineering and mill operations. Write for the Globe Stainless Steel Tubes catalog.

GLOBE STEEL TUBES CO., Milwaukee 46, Wis.

Chicago — Cleveland — Detroit — New York — Philadelphia — St. Louis — Denver — Houston — San Francisco — Glendale, Cal.

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — alloy — carbon seamless steel tubes — Globeiron (high purity ingot-iron) seamless tubes — Globe welding fittings.

ADVANCED FERRO-PHOBIA

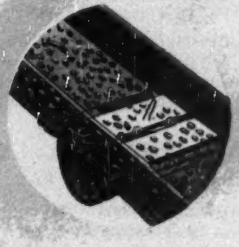


. . . Fer'ro-pho'bia, n. Fear of iron. It's enough to kill any cost-conscious plant manager—fear of tramp iron damaging equipment, causing shutdowns, ruining product purity.

No couch can cure it, but a Dings Magnet can. When ferro-phobia symptoms—unhappy people moaning about lost production—show up in your plant, phone your representative or write Dings. They'll prepare an effective magnetic Rx, backed by 50 years of experience, that will end the plague in a hurry.

We Wiped Out the Plague in Texas—With this "super" 3-stage magnetic hump built for one of the nation's biggest plastic manufacturers. It separates iron contaminated polyethylene pellets from iron-free pellets.

Powerful, non-electric Dings Perma-Plate magnets stop iron in the hump, chutes or ducts. Magnetic strength guaranteed forever.



Dings

DINGS MAGNETIC SEPARATOR COMPANY
4730 West Electric Avenue
Milwaukee 46, Wisconsin

DINGS MAGNETIC SEPARATOR COMPANY
4730 West Electric Avenue
Milwaukee 46, Wisconsin

Please send me Catalog C-1205-B on Dings Perma-Plate Magnets and Catalog C-5000-B with data on the complete Dings line.

Name_____ Title_____

Firm_____

Address_____

PP-153

Useful for: Paints – Adhesives – Cements – Anti-Rust Compounds – Floor Tile – Textiles Waterproofings – and many other products

PICCOUMARON

Available in ten melting points from a liquid to tough, brittle solids. Brief descriptions of principal properties are given below. Complete data and samples will be gladly sent upon request.

SOLUBILITY

COLORS

GRADES

WEIGHTS

CHEMICAL PROPERTIES

PLASTICIZERS

COMPATIBILITIES

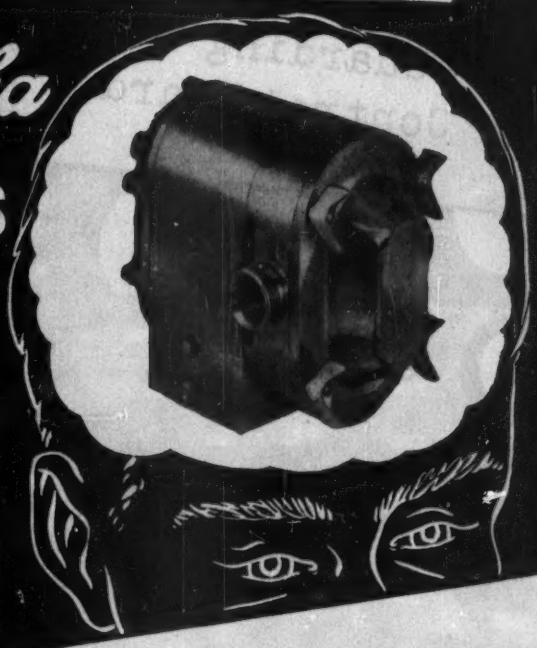
PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.

CLAIRTON, PENNSYLVANIA

for your benefit . . . and product protection

Waukesha

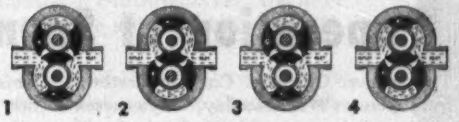
CONCENTRATES on POSITIVE DISPLACEMENT Sanitary Pumps



There are many reasons why Waukesha makes P.D.* Sanitary Pumps *exclusively* — and they all work to *your* benefits, whether your product is liquid, semi-liquid, creamy or chunky.

With Positive Displacement pumping, for instance, you eliminate the turbulence, churning, agitation and aeration so damaging to most products. For the Waukesha needs no "Buzz-Saw" speed to overcome high pressures or achieve volume production. Through its gentle, slow speed action, large open chambers, positive twin blade impeller delivery, your product comes *out* as perfect as it goes *into* the Waukesha, without damage or waste.

Positive, Safe Product Flow . . .



Waukesha Balanced Twin Blade Impellers, operating at slow speeds, form four large chambers in the pump head which gently draw and discharge four complete product-loads with each revolution. Positive delivery without agitation, churning or aeration.

For production savings, product protection, clean-up savings, longer service life — move your product with WAUKESHA POSITIVE DISPLACEMENT SANITARY PUMPS *exclusively*. Capacities from 20 pounds to 60,000 pounds, in V-Belt or Variable Speed drives. And if your operations require output line protection, Waukeshas are available in Vented Cover design also.

Write for details on the advantages of Waukesha Pumps in your plant

WAUKESHA FOUNDRY CO.
WAUKESHA, WISCONSIN

Waukesha 100% SANITARY PUMPS
Dependable Product of a Responsible Manufacturer

Case No. 63

Kemp Oriad Dryer Gives "Most Satisfactory Service" Guarding Spencer Control Board

How Kemp assures round-the-clock operation at Spencer Chemical

The Spencer Chemical Co., Charlestown, Ind., operates 24 hours a day, 7 days a week, making nitrogen compounds for the fertilizer industry. Heart of this operation is the master instrument board that controls all plant processes. These instruments are operated by compressed air, which must be dried to prevent rust and corrosion within the controls.

Kemp Offers Continuous Protection

Spencer uses a Kemp Oriad Dryer to dry all the air required and completely protect the delicate instruments from moisture damage. Since its installation in 1950, this Kemp unit has needed no service of any kind. And Spencer is delighted with Kemp's ease of operation! Mr. N. S. Whitaker, Works Manager, commenting on Kemp's "most satisfactory service," says, "Operation is simplicity itself. All we have to do is switch a lever once a week. Capacity is ample for one week of maximum flow, on a 24-hour 7-day operation."

Kemp Dryers for Every Purpose

Kemp offers a variety of dryer models to meet all problems. Designed to dry air to sub-zero dew points at low cost, these efficient dryers embody the engineering knowledge gained from Kemp's many years of experience. They are available with manual, semi-automatic, or fully automatic tower reactivation. In addition, Kemp will prescribe the proper desiccant for each specific drying job. If you have a problem involving the drying of air, gases, or liquids, contact Kemp engineers now.

Only operation required on Kemp Oriad Dryer is moving lever once a week to switch flow of air to second column. First column is reactivated by heat during the week.

For more complete facts and technical information, write for Bulletin D-27 to: THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

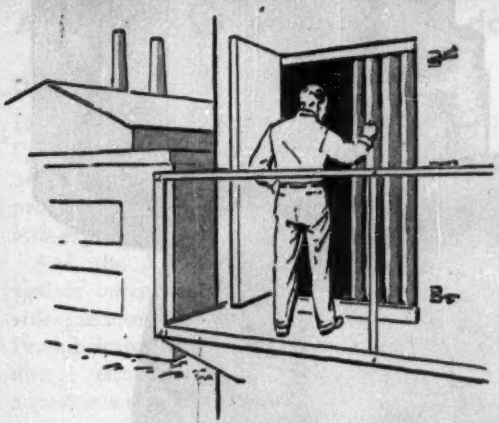
KEMP OF BALTIMORE

DYNAMIC DRYERS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • INERT GAS GENERATORS
SINGEING EQUIPMENT

Filter bags of ORLON® help clear the air in Los Angeles

ACRYLIC FIBER



ALONG WITH the expansion of industry in the Los Angeles area came a serious problem—industrial air contamination. One of the local firms, The Lincoln Foundry Corporation, is doing its part towards cleaner air . . . with the help of filter bags of "Orlon".

Not long ago, solid particles and gases from the Lincoln Foundry's cupola were being discharged into the Los Angeles air. The problem was to reduce this emission from 174 lbs. per hr. to 13.58 lbs. per hr. . . . the limit required by the rules and regulations of the Los Angeles County Atmospheric Pollution Control District.

The Lincoln Foundry met the problem by installing a dust collector system made by the American Wheelabrator & Equipment Corporation. This system uses filter bags of "Orlon" to trap wastes at temperatures up to 275°F., and keep them from escaping into the air. Now, with the collector system installed, emission of waste from the cupola is reduced to a point where it can't even be detected, is far less than the requirement of the Pollution Regulation.

Filter bags of "Orlon" acrylic fiber were selected for this demanding job because of the fiber's remarkable properties. For "Orlon" is tough enough to resist corrosive gases . . . strong enough to withstand the periodic shaking which takes place automatically in this collection system. And its resistance to heat contributes to long, trouble-free service. After 13 months of continuous use, the filter bags of "Orlon" are still in excellent condition.

This is just one of the many cases where "Orlon" provides the answer to a tough problem . . . assures easy operation and lower operating costs. Currently "Orlon" is being used for both hydraulic and pneumatic types of filtration. And manufacturers are finding an ever-increasing number of new uses for this fiber—from weather-resistant convertible tops to good-looking work clothes that hold their press.

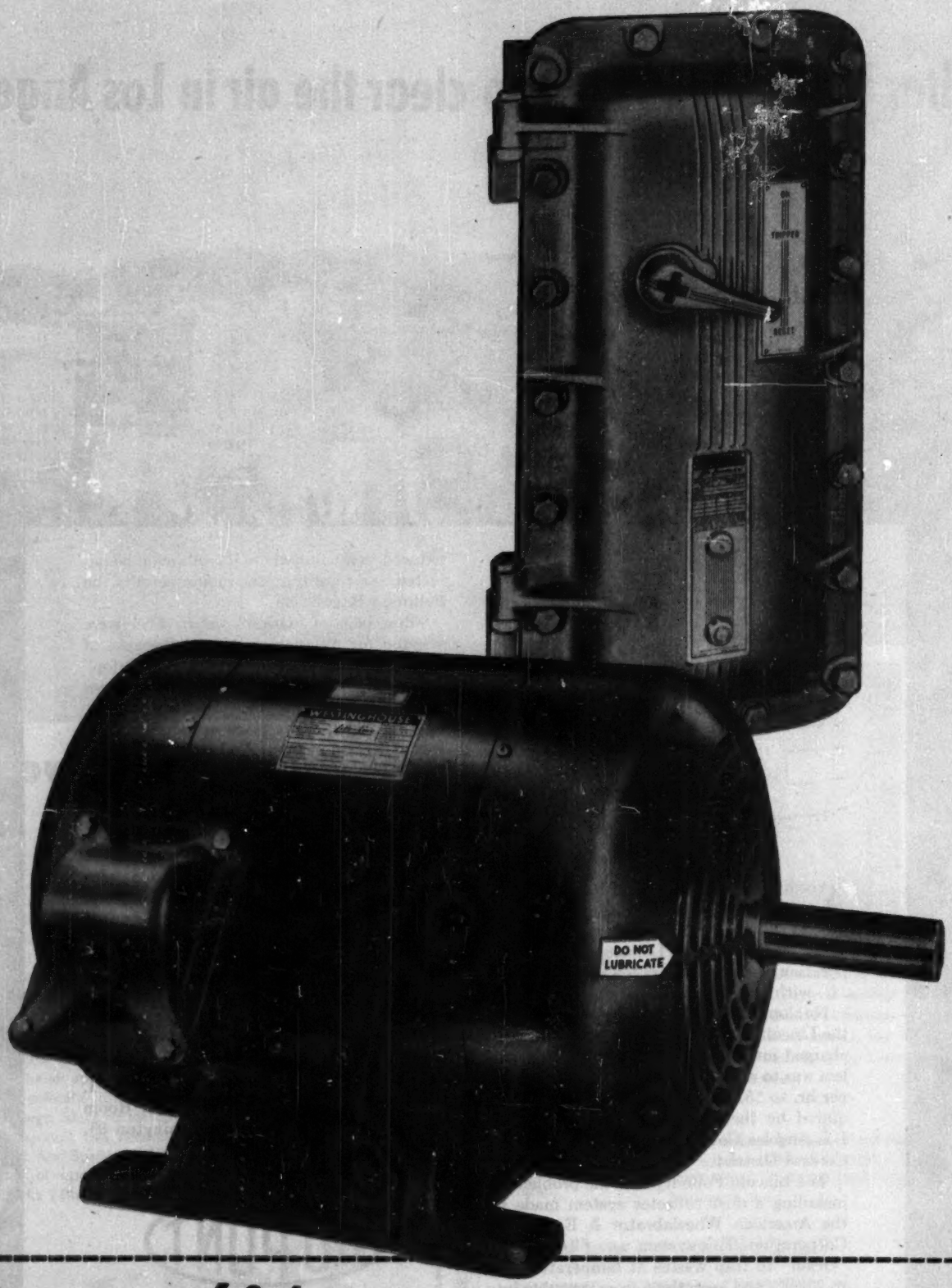
It will pay you to find out how "Orlon" can help you in your business. Write E. I. du Pont de Nemours & Co. (Inc.), Room 2522E, Nemours Building, Wilmington 98, Delaware.

ORLON is Du Pont's trade-mark for its acrylic fiber.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY



WHAT *Life-Line* REALLY DELIVERS IS MORE SERVICE... LESS SERVICING

The time to stop explosions is before they start

And here's the equipment to do it

Dual Label Explosion-Proof Motor

In any location where Class II, Group G, or Class I, Group D explosive materials present a hazard, you can operate this Life-Line explosion-proof motor safely. It's underwriter approved for *both* explosive dusts and explosive vapors.

And the Life-Line offers extra protection against outages. Heavy steel construction provides greatest protection against physical damage. Pre-lubricated bearings need no further lubrication . . . eliminate outages due to faulty greasing. Superior winding techniques and insulation reduce electrical failures. Together they add up to longer life . . . less servicing.

For Hazardous Locations—Life-Linestarters®

Specially reinforced, cast enclosures with wide flame seals are available in Class I, Group D. Class II, Groups E, F, G are also available. Bi-metal overload relay protection and AB Circuit Breakers cut down time. In case of fault, no need to remove cover to reset breaker or overload relay mechanism. Service is restored immediately.

Simple design, single operation mean fewer operating parts to foul. Seesaw action of clapper prevents accidental operation. Kickout spring assures positive opening. Exclusive "De-ion®" arc quenching plus silver-to-silver contacts eliminates contact filing. Compare any other starter and see why Life-Lines offer more service with less servicing.

Together Life-Line motors and starters offer the food industry a new concept in performance. You get more service on the job . . . less down time and servicing. Ask your Westinghouse representative for complete details on both, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21701-A

YOU CAN BE SURE...IF IT'S

Westinghouse

Whatever the Pumping Job

WHEN YOU SPECIFY

"Buffalo"

YOU'RE SPECIFYING

SATISFACTION

(Photo courtesy Washington Sunday Star)

* *Above, the 25' fountain produced by the No. 2 "Buffalo" SL Double Suction Pump bottom right, in Flower and Garden Show, National Guard Armory, Washington, D. C. Installation by Standard Engineering Company, Washington, D. C.*

It isn't every day that a "Buffalo" pump is called on to create a 25-foot fountain for a Flower and Garden Show—in fact, probably 99.99% of our pumps feed boilers, handle paper stocks or pump clear water in every conceivable commercial or industrial application.

The point is, they do those jobs well, as users can tell you.

In the "Buffalo" line, you'll find:

(1) *The RIGHT pump.* The line includes acid, rubber-lined, alloy, double-suction, single-suction, multistage, close-coupled, diagonally or horizontally split-shell, for almost any conditions.

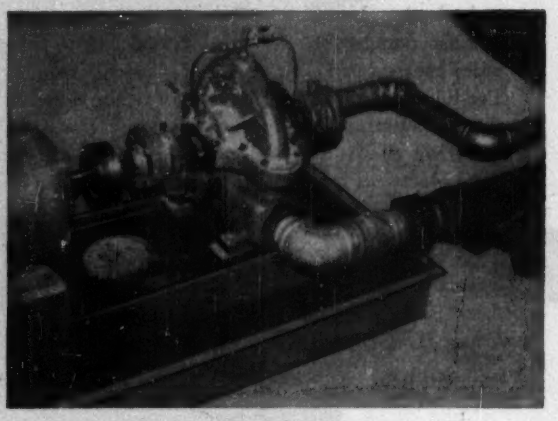
(2) *Efficiency—long life.* Impellers are husky, efficient enclosed type, and liquid passages are formed for least resistance.

(3) *Easy maintenance.* All parts are readily accessible, including impellers, stuffing boxes and bearings.

To be doubly sure that each "Buffalo" pump will perform up to specification on the job, it must pass a load test before shipment, duplicating the actual hydraulic conditions of the job for which it is intended.

Why not put a "Buffalo" Pump on your next job—for permanently satisfactory results? Write for details.

SL Pumps handling chilled water in a large air conditioning installation.



No 2 "Buffalo" SL Double Suction Pump

BUFFALO "Buffalo" PUMPS, INC.

501 BROADWAY — BUFFALO, N. Y.

Subsidiary of Buffalo Forge Company

Canada Pumps, Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

To get better prints... faster

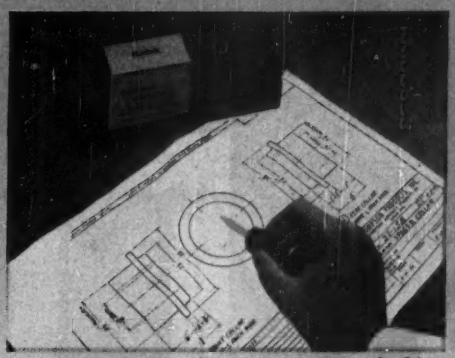
Tapco Plant, Thompson Products, Inc. uses Kodagraph Autopositive intermediates in print production.

The Tapco Plant knows full well that illegible shop prints pave the way for costly reading errors; knows, too, that Kodagraph Autopositive intermediates are low-cost insurance against such a possibility.

It therefore reproduces its more critical and complex jet and valve drawings on Kodagraph Autopositive Paper Translucent and thus obtains—quickly and easily—sparkling "masters" for print-making which have dense photographic black lines on an evenly translucent, premium-quality paper base; *which* will produce highly legible whiteprints time after time at *stepped-up* machine speeds.

Extremely fine-detailed drawings are reproduced on Kodagraph Autopositive Film, which captures the faintest detail . . . keeps close lines from "filling in". . . and produces top-quality photographic intermediates which have extremely fast print-back speeds.

No negative step . . . no darkroom handling. Kodagraph Autopositive Paper and Film are handled in exactly the same manner . . . produce positive photographic intermediates *directly*. First, they are exposed in one of the Tapco Plant's direct-process machines—or in a photocopy unit. Then, they receive standard photographic processing. A fast, convenient room-light operation all the way. And no new equipment needed.



Autopositive intermediates save creative drafting time. Tapco Plant makes necessary changes in its basic designs without costly redrafting by (1) making Autopositive prints of the original drawing; (2) removing the unwanted detail from the Autopositive reproduction with eradicator fluid. Then, the draftsman has only to add the new detail . . . and a print-making master is ready. *One* which will produce highly legible prints without confusing "ghost" images in the eradicated area.

Autopositive reclaims "unprintables." Many old drawings that have lost line density or are soiled or torn are transformed into print-making masters by reproducing them on Autopositive Paper or Film. Stains and crease marks are dropped out . . . weak detail is made more legible—saving hours of redrafting. Autopositive Paper is also used to duplicate a variety of office records, non-translucent vendor prints, etc.

Kodagraph Autopositive Materials

"THE BIG NEW PLUS" in engineering drawing reproduction

MAIL COUPON FOR FREE BOOKLET

EASTMAN KODAK COMPANY 105

Industrial Photographic Division, Rochester 4, N.Y.

Gentlemen: Please send me a copy of your illustrated booklet giving the facts on Kodagraph Reproduction Materials.

Name_____ Position_____

Company_____

Street_____

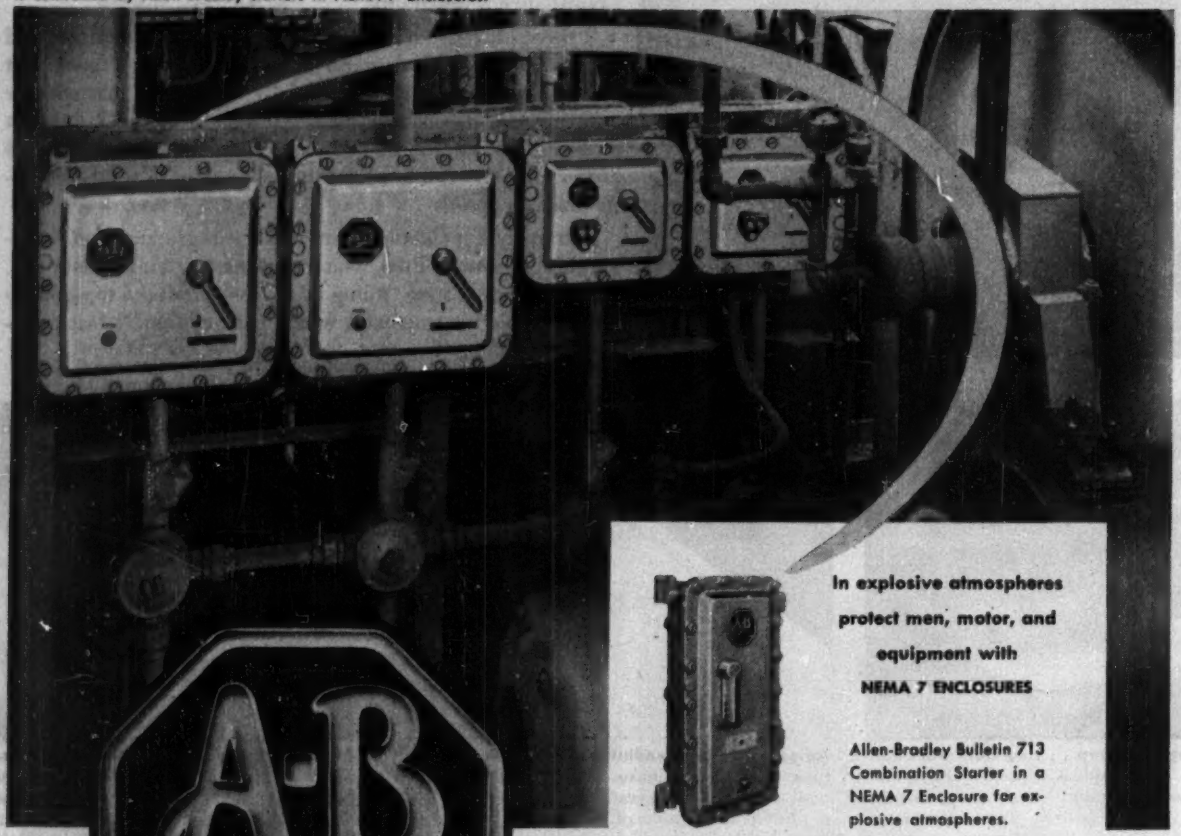
City_____ Zone_____ State_____

Kodak
TRADE-MARK

In explosive atmospheres...
it pays to install trouble free

ALLEN-BRADLEY MOTOR CONTROL

The steel ball mill for grinding pigments in this chemical plant is controlled by Allen-Bradley starters in NEMA 7 Enclosures.



In explosive atmospheres protect men, motor, and equipment with NEMA 7 ENCLOSURES

Allen-Bradley Bulletin 713 Combination Starter in a NEMA 7 Enclosure for explosive atmospheres.

A-B Quality

The Sign of Quality in Motor Control

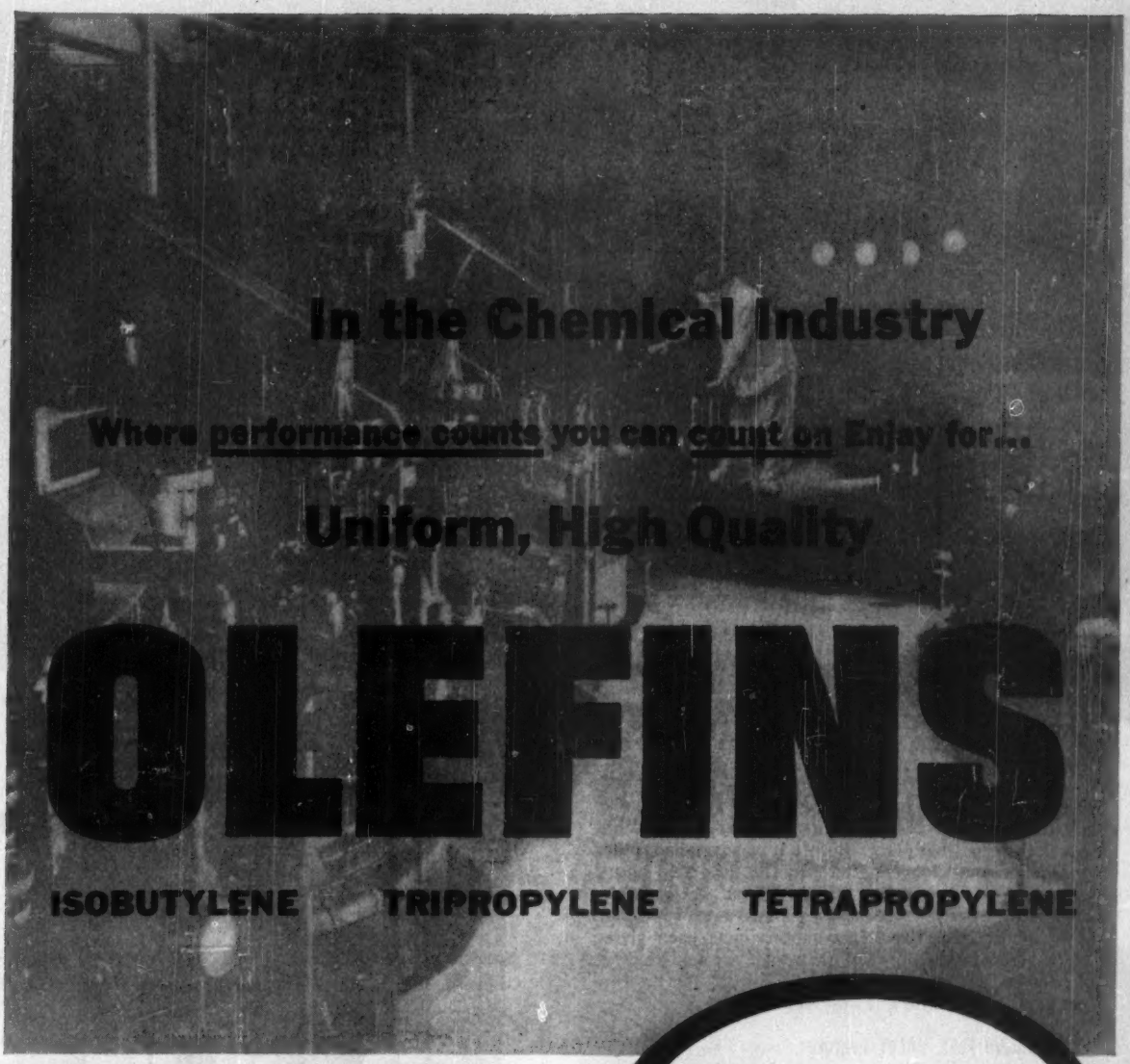
ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

Where hazardous gases or vapors exist, install Allen-Bradley motor controls in NEMA Type 7 Enclosures. Constructed of cast iron with wide machined flanges, these installations provide maximum protection to man, motor, and machine.

Allen-Bradley solenoid motor starters and bolted enclosures are an ideal combination because double break, silver alloy contacts need no maintenance. The starters have only ONE moving part—no pins, pivots, bearings, or jumpers to cause trouble. Therefore, only very occasional inspection is necessary. Frequent time-robbing removal of bolted covers is ended. See the nearest Allen-Bradley control engineer, today, for his recommendations.

Allen-Bradley Co., 1337 S. First St., Milwaukee 4, Wis.



A pioneer and leading manufacturer of Olefins, the Enjay Company and its affiliates have greatly expanded plant facilities to keep pace with increased sales. Chemical manufacturers are finding more uses for Enjay Olefins in the production of derivatives such as alkylated aromatic hydrocarbons, alkylated phenols and cresols, mercaptans, higher alcohols and polymers.

A complete line of dependable products for Industry

PETROLEUM	SURFACE COATING	CHEMICAL
PARANOX	PETROHOL 91	PETROHOL 91
PARATONE	PETROHOL 95	PETROHOL 95
PARAFLOW	PETROHOL 99	PETROHOL 99
PARAPOID	Secondary Butyl Alcohol	Iso-Octyl Alcohol
PARADYNE	Secondary Butyl Acetate	Decyl Alcohol
PARATAC	Isopropyl Acetate	Tridecyl Alcohol
PETROHOL	Acetone	Dicyclopentadiene
Methyl Ethyl Ketone	Methyl Ethyl Ketone	Isoprene
Dewaxing Aid	Ethyl Ether	Butadiene
Ethyl Ether	Isopropyl Ether	Ethyl Ether
Isopropyl Ether	Dicyclopentadiene	Isopropyl Ether
Reference Fuels	Naphthenic Acids	Tripropylene
	Iso-Octyl Alcohol	Tetrapropylene
	Decyl Alcohol	Aromatic Tars
		Acetone
		Methyl Ethyl Ketone

ENJAY

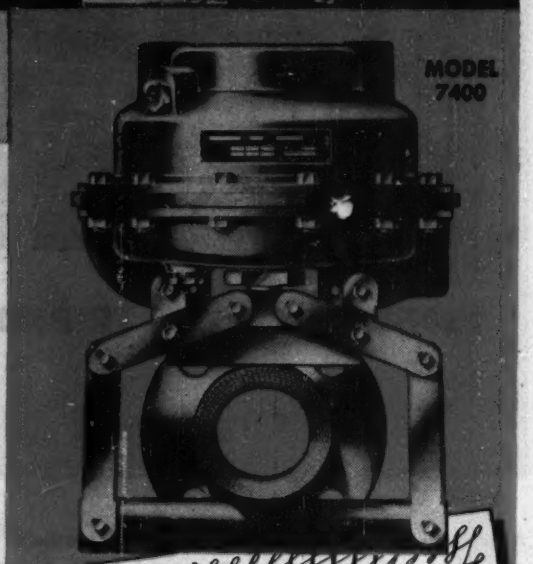
The Enjay Company has long been recognized as a leader in the development and marketing of high-quality products for the oil, surface coating and chemical industries. Backed by greatly expanded plant and distribution facilities, the Enjay Company is supplying a constantly growing list of chemical products to many different industries.

BE SURE TO CALL ON ENJAY FOR YOUR CHEMICAL NEEDS

ENJAY COMPANY, INC.
15 West 51st Street, New York 19, N. Y.

CUSTOMER'S QUOTE

"ONLY FLEX VALVE COULD DO THIS JOB!"



This diaphragm motor-operated Farris Flex Valve is handling a hard-to-convey, semi-solid slurry in a leading chemical processing plant. Before it was installed, other types of valves clogged after as little as a few hours' service. *Yet Flex Valve has performed perfectly for more than 3 years, in a 24-hour, 7-day-week operation.* Many other Flex Valve installations have been giving trouble-free, continuous service for 15 years or more. If you have a problem in controlling flow of any hard-to-handle fluid, send for Catalog No. FL 382-A.

Exclusive FLEX VALVE Features (Pat'd & Pat. Pending)

- Will outwear any metal valve on abrasive service. Proven minimum 11 to 1 life over metal.
- Full pipe capacity.
- Will not freeze up in outdoor service.
- Excellent control characteristics in first ⅓ of travel.
- Complete closure for bubble-air tightness.
- Tight on grits up to ⅛".
- No obstructions, pockets, or internal parts.
- Valve body available in pure gum rubber, neoprene, butyl, buna-n, buna-s, food stock and special compounds.

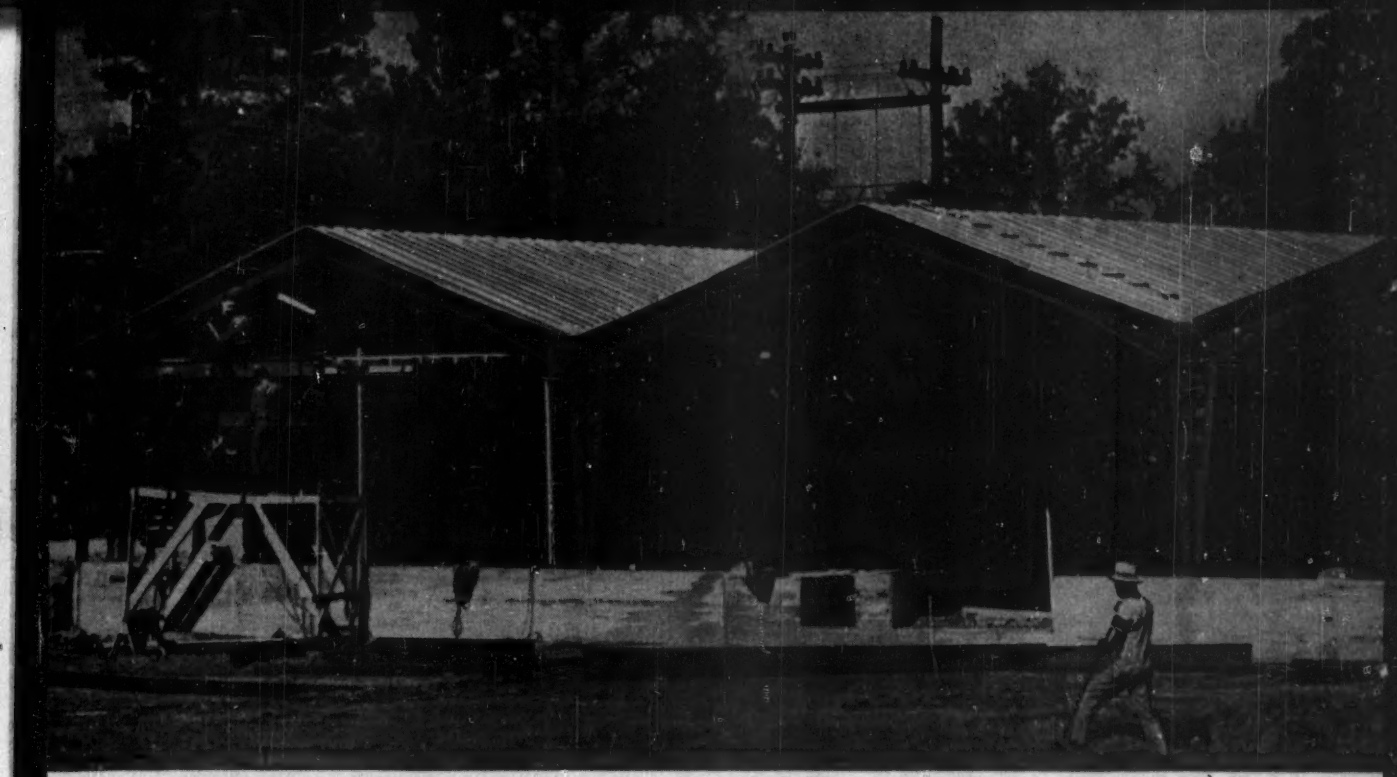
We Guarantee
YOUR MONEY BACK
if Flex Valve plugs

Farris

Representatives in Principal Cities

FLEXIBLE VALVE CORP., Palisades Park, N. J., U. S. A.

Affiliates: Farris Engineering Corp. • Farris Stacom Corp. • Farris Hydroseal Corp. • Farris Hydrotorque Corp.



This Butler installation will be completed and ready for use in a matter of days! Butler rigid frame construction and truss-clear roof assures you full usable space.

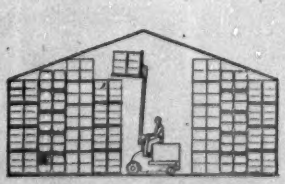
you can get BUTLER buildings up, at work in only 30 days

Quick, easy erection of Butler buildings means you can build a complete new plant, or expand your present facilities in a hurry. You can get the floor space you need for processing, packaging or storage in *days* instead of weeks!

Fast erection also means big savings in time and labor that cut construction costs. Teamed with the low initial cost of Butler buildings, it helps keep investments in permanent installations at a minimum. Butler buildings, with galvanized or aluminum sheets are weather-tight, fire-safe. Insurance rates are low. They require practically no maintenance!

See your Butler dealer, or send coupon right away. Learn how you can save time and money with Butler buildings.

Chemical plant in Memphis, Tenn., uses this 50′ x 100′ x 14′ Butler building with modified center section. You can get single span, combination or multiple Butler buildings in widths, lengths and heights to fit your exact plant specifications.



MORE SPACE PER DOLLAR for processing, packaging or storage facilities!

KANSAS CITY, MO.
Birmingham, Ala. — Richmond, Calif.
Galesburg, Ill. — Minneapolis, Minn.

BUTLER
STEEL PRODUCTS

OIL EQUIPMENT — STEEL BUILDINGS
FARM EQUIPMENT—CLEANERS EQUIPMENT
SPECIAL PRODUCTS

For prompt reply, address office nearest you:

BUTLER MANUFACTURING COMPANY

7338 East 13th Street, Kansas City 26, Missouri
938A Sixth Avenue, S.E., Minneapolis 14, Minnesota
Dept. 38A, Richmond, California

Please send me the name of my nearest Butler dealer—also more information on Butler buildings for use as

_____

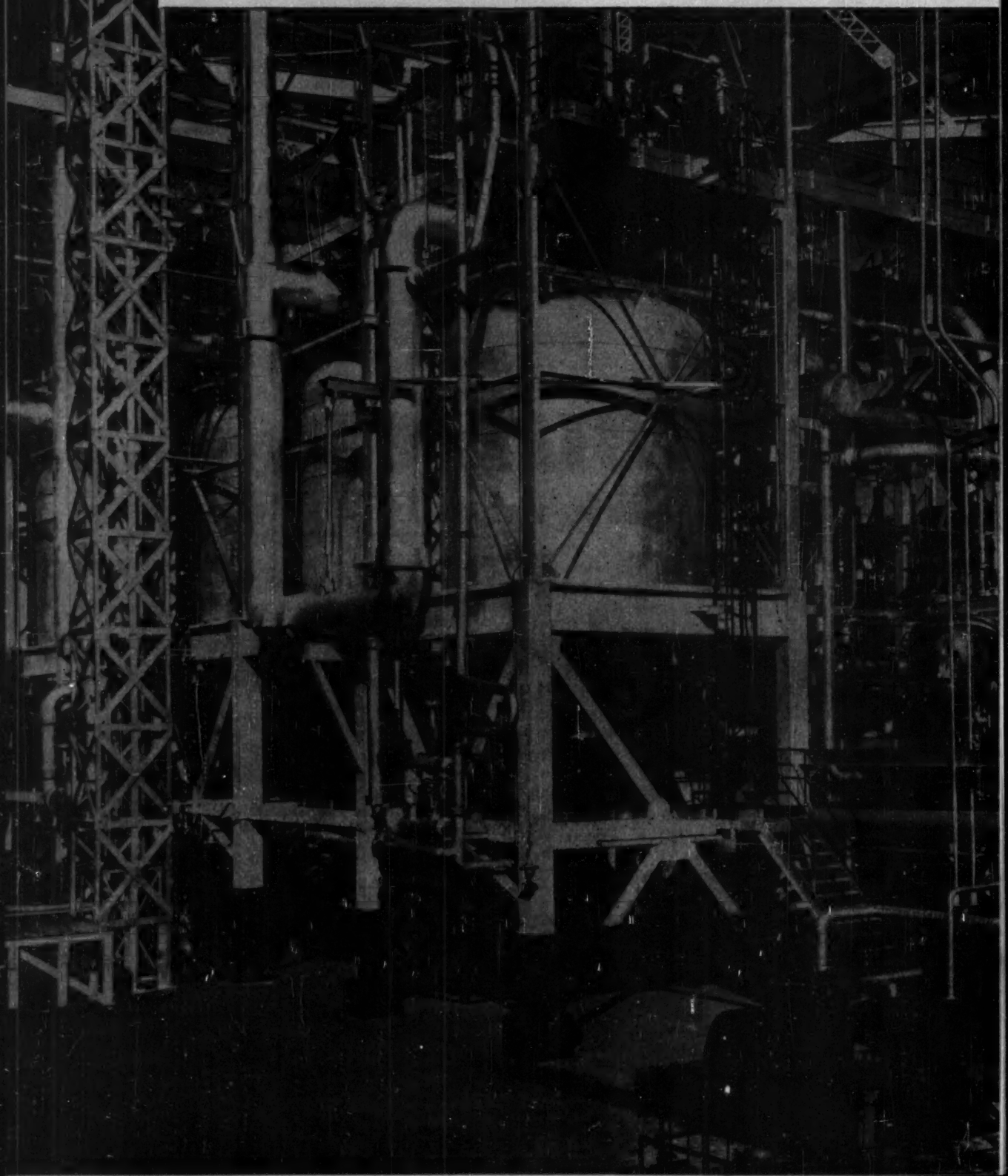
Name_____

Firm_____

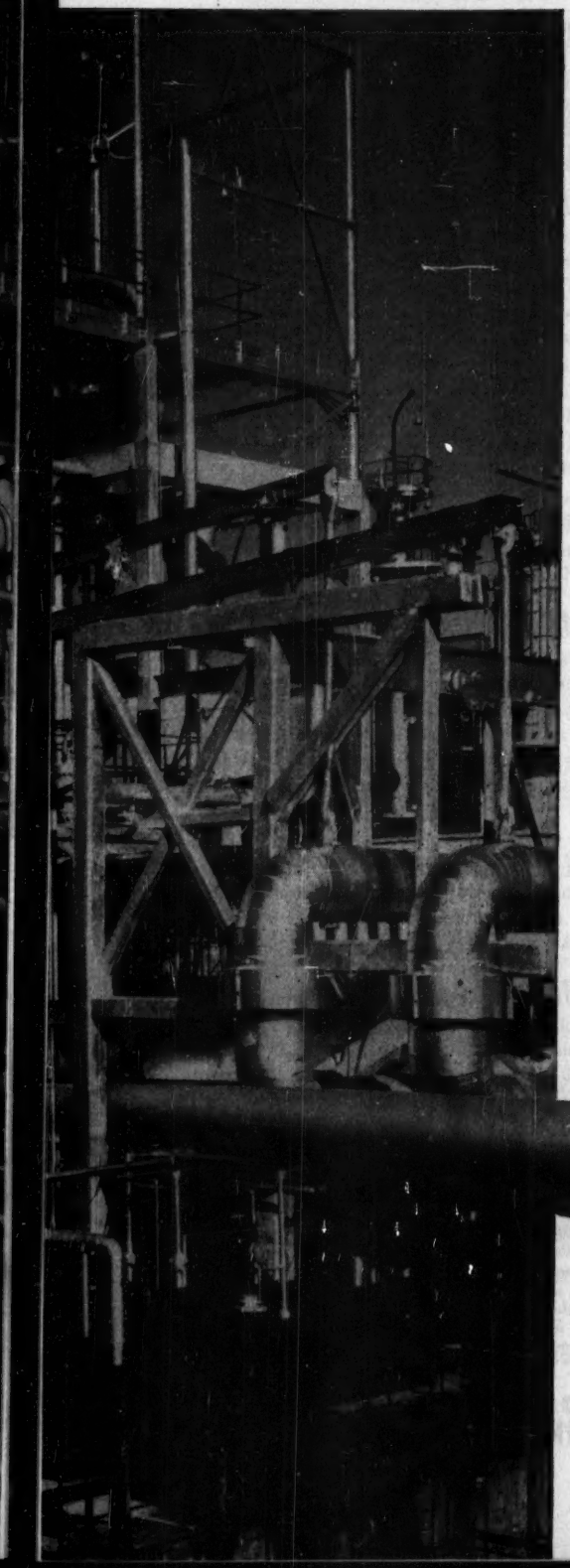
Address_____

City_____ Zone____ State_____

HOW NORDSTROMS *PLUS*



Lubricaut Keep Plants "On Stream"



A modern refinery or chemical plant costs several million dollars to build. Most are designed to operate constantly; most must if they are to pay out.

But . . .

Valve failure at a key point may shut down whole units, or perhaps a whole plant.

Under some circumstances, almost any mechanical equipment can break down, of course, but there is far less likelihood of a Nordstrom giving trouble in most services than any other type of valve.

Why? . . .

NORDSTROM VALVES ARE LUBRICATED. A film of plastic lubricant spreads around the valve ports to seal tighter than metal-to-metal contact. At the same time the lubricant protects seating areas against wear and galling, and it keeps the valve ready to turn quickly.

NORDSTROM VALVES CAN BE MAINTAINED IN SERVICE. You don't have to shut down a line to repack Nordstroms. The seat can be renewed by loosening the stop and reversing the plug 180 degrees. The valve can be relubricated under pressure at any time. And because of the design, there is far less chance of major damage to stem, plug or body, so that it is rare, indeed, that a properly maintained Nordstrom valve has to be taken out of service for repair.

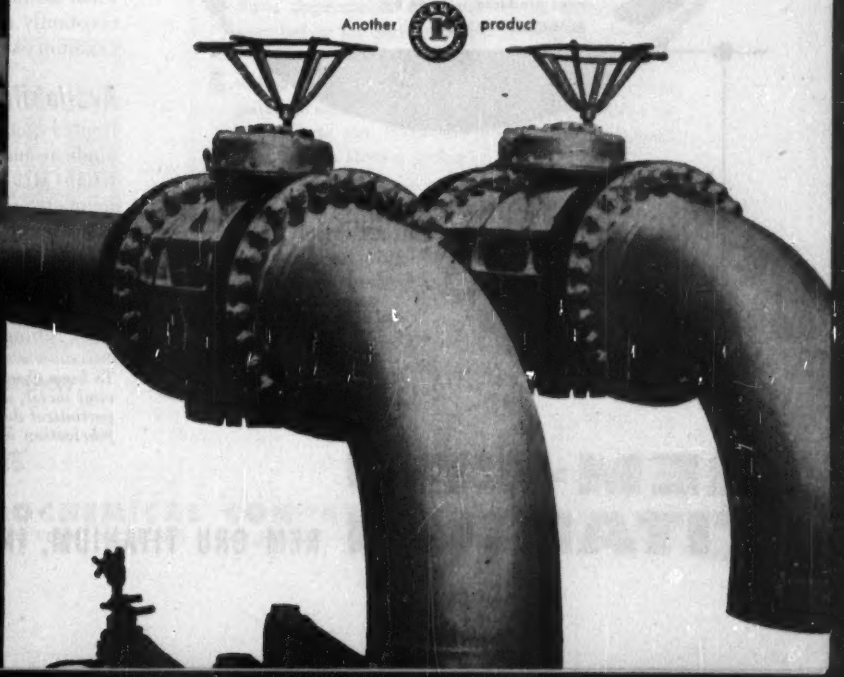
NORDSTROM VALVES HAVE STRAIGHT-THROUGH FLOW. With no body or bonnet areas to catch sediment or cause turbulence, wear is reduced and choking or damming up is impossible in most services.

There is only one way to save money on valves—buy the right ones, buy the best ones in the first place, and then give them proper care. No valve is a cheap valve if it fails.

Nordstrom valves are not always the cheapest in original cost, but over the long pull they always are. And, there's a *right* Nordstrom valve—the right size, right corrosion-resistant material, right body pattern, and right pressure—for nearly every process requirement. Let your Nordstrom sales engineer show you, or write for a Nordstrom Catalog to Rockwell Manufacturing Company, Pittsburgh 8, Pa.

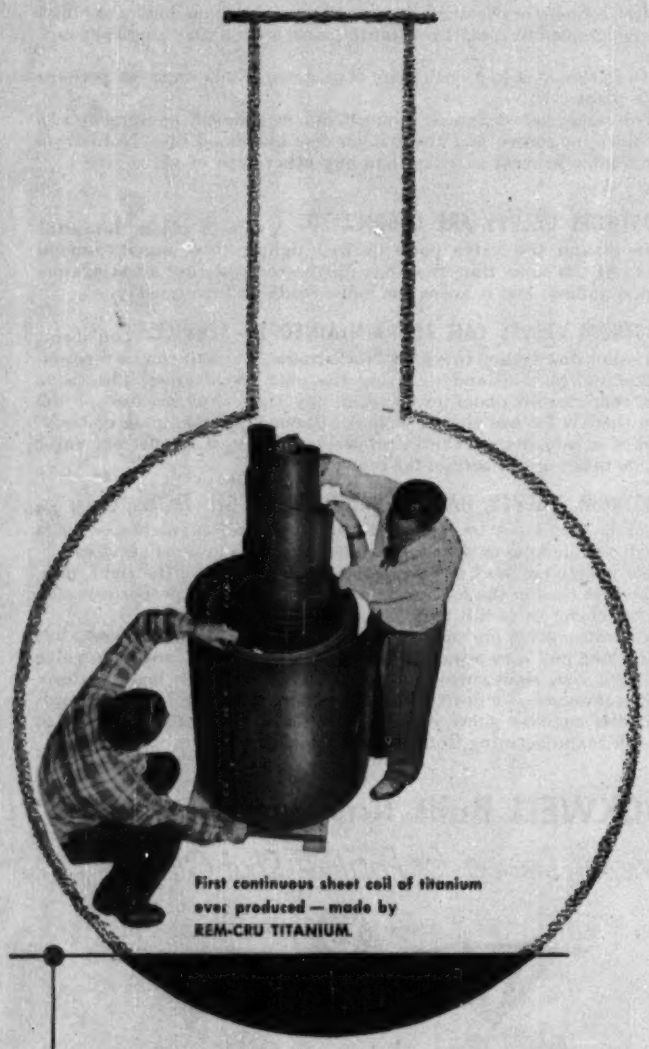
ROCKWELL Built Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off



REM-CRU TITANIUM

facts about a new metal for the chemical industry



First continuous sheet coil of titanium ever produced — made by REM-CRU TITANIUM.

DURING THE PAST five years titanium has progressed from a laboratory curiosity to an accepted engineering material with an annual production of thousands of tons. Here are additional facts . . . presented by REM-CRU TITANIUM, INC.— a principal producer of this new metal.

Outstanding Properties—One of the most remarkable characteristics of titanium is its resistance to chloride solutions. It is completely unattacked in sea water—the only structural metal impervious to brine attack. Titanium is not corroded by most nitric acid solutions, wet chlorine and chlorine water, mixed sulphuric and nitric acids, ferrous chloride, cuprous chloride and most alkali salts. It is not recommended, however, for service in mineral acids unless oxidizing agents are present, nor in formic acid or dry chlorine.

Titanium has another "good" point which makes it a valuable metal for the chemical industry. It retains useful strength up to 800-1000F, an important factor in the design of modern equipment.

Potential Applications—Most titanium produced to date has been for the aviation industry. However, many chemical engineers are studying and testing it to take advantage of its unique properties as promptly as possible. The density of titanium is only 60% that of steel while its strength, particularly in alloy grades, is greater than many steels.

Promising applications are condensers, evaporators, autoclaves, containers, tubing, valves and fittings. Field testing under individual plant conditions is constantly revealing new spots where the use of titanium can eliminate costly replacements.

Availability—Today titanium is available only in limited quantities for other than priority military applications. But production is increasing rapidly. REM-CRU has been producing 1200 to 1900 pound ingots for some time and last year melted the first 4000 pound ingot. This permitted commercial production of sheet in continuous coil form. REM-CRU titanium is produced in four grades, and in practically all forms—bars, plates, sheet, strip, wire, tubing, forgings and billets.

To keep abreast of the latest developments on this vital metal, write for the Rem-Cru Review—a free periodical devoted to the application and fabrication of titanium alloys.

REM-CRU TITANIUM **REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA**

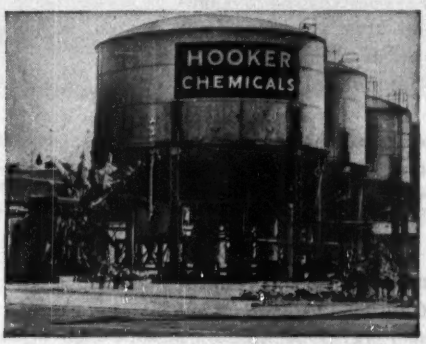
Umpty-thousand tons of HOOKER CAUSTIC *Coming up!*

CONVEYORS feed salt to brine tanks for caustic soda and chlorine production in Hooker electrolytic cells.

We will produce more caustic soda this year than ever before in our history.

This would be meaningless, except that it expresses our belief in the future of the chemical industry—and our readiness to keep growing with it as one of your major suppliers of chemical raw materials and intermediates.

Today, more than ever, you can count on Hooker for dependable supplies of caustic soda, chlorine and many other industrial chemicals.



CAUSTIC SODA DISTRIBUTING STATION

5 Reasons for Specifying HOOKER Caustic

1 **Large-tonnage production**—The biggest in nearly 50 years—means dependability of supply for you.

2 **Quality caustic in the form to meet your needs** 50% and 73% liquid; flake; solid. Drums, tank cars, barges. An impressive background of experience in serving large users of caustic.

3 **Technical service**—Willing, competent help in safe handling and use of caustic in your process. Experience gained from serving 30 industries is at your disposal.

4 **Fast, dependable deliveries**—More facilities than ever before for getting caustic to you, on schedule.

5 **If you use caustic in l/c/l quantities,** you can now purchase caustic from a Hooker plant, warehouse or jobber near you. Write us for name and address of your nearest Hooker jobber.

FOR ANALYSES, PRICES, DELIVERY INFORMATION, write Hooker Electrochemical Company, 5 Forty-seventh Street, Niagara Falls, N. Y.—or phone your nearest Hooker sales office.

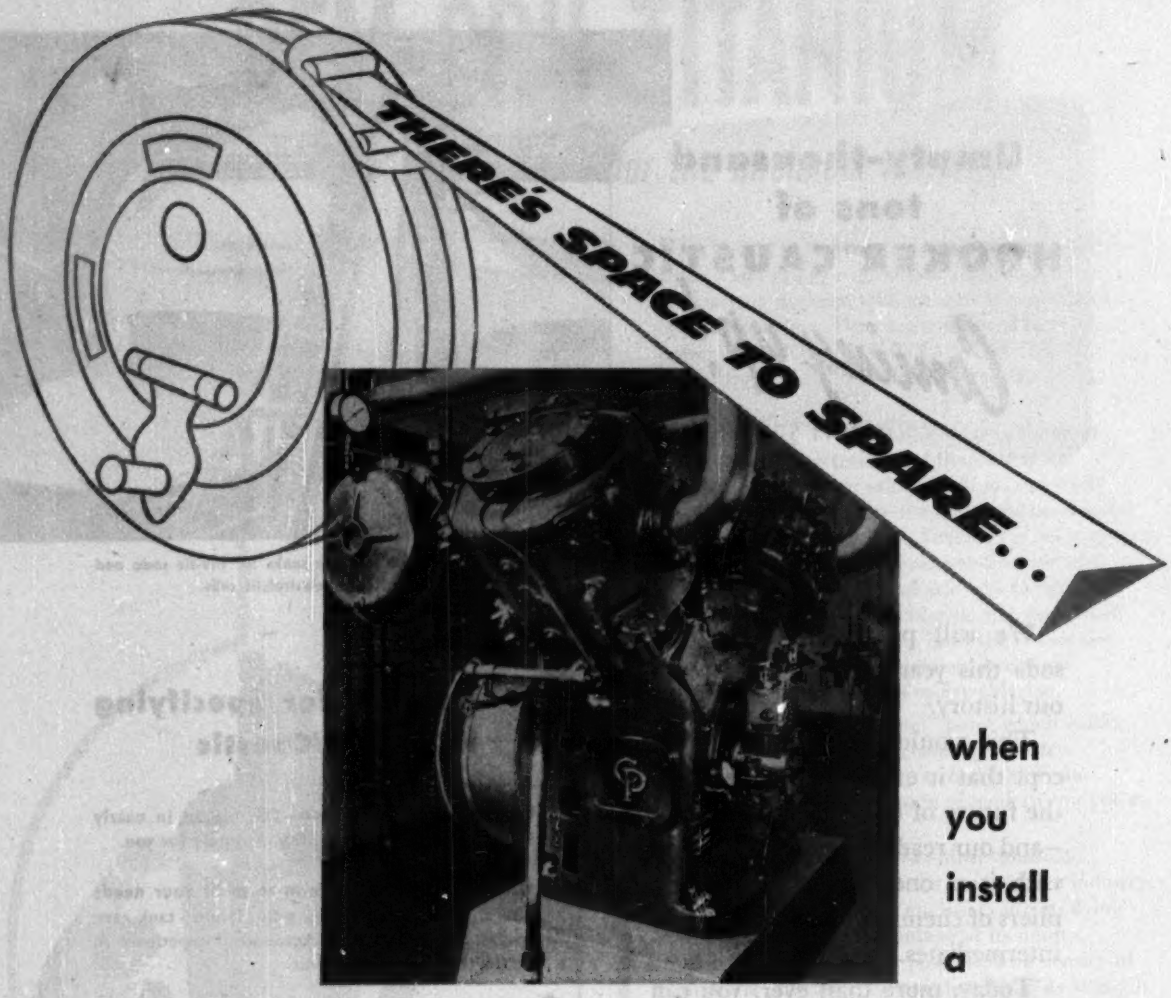
From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

NIAGARA FALLS • TACOMA • NEW YORK • CHICAGO • LOS ANGELES, CALIF.

HOOKER CHEMICALS

2-1934



when you install a **TYPE Y** compressor

Where space is limited, industry relies more and more on Chicago Pneumatic's compact, heavy-duty Type Y Compressor. It takes up minimum floor area, yet is ideal for long, continuous heavy duty. Shipped as a complete "package" ready for easy installation, it requires the simplest of foundations—needs no alignment.

The highly efficient Type Y Compressor has roller main bearings, precision connecting rod bearings, multi-step capacity regulation, and an easy-to-clean shell-and-tube intercooler.

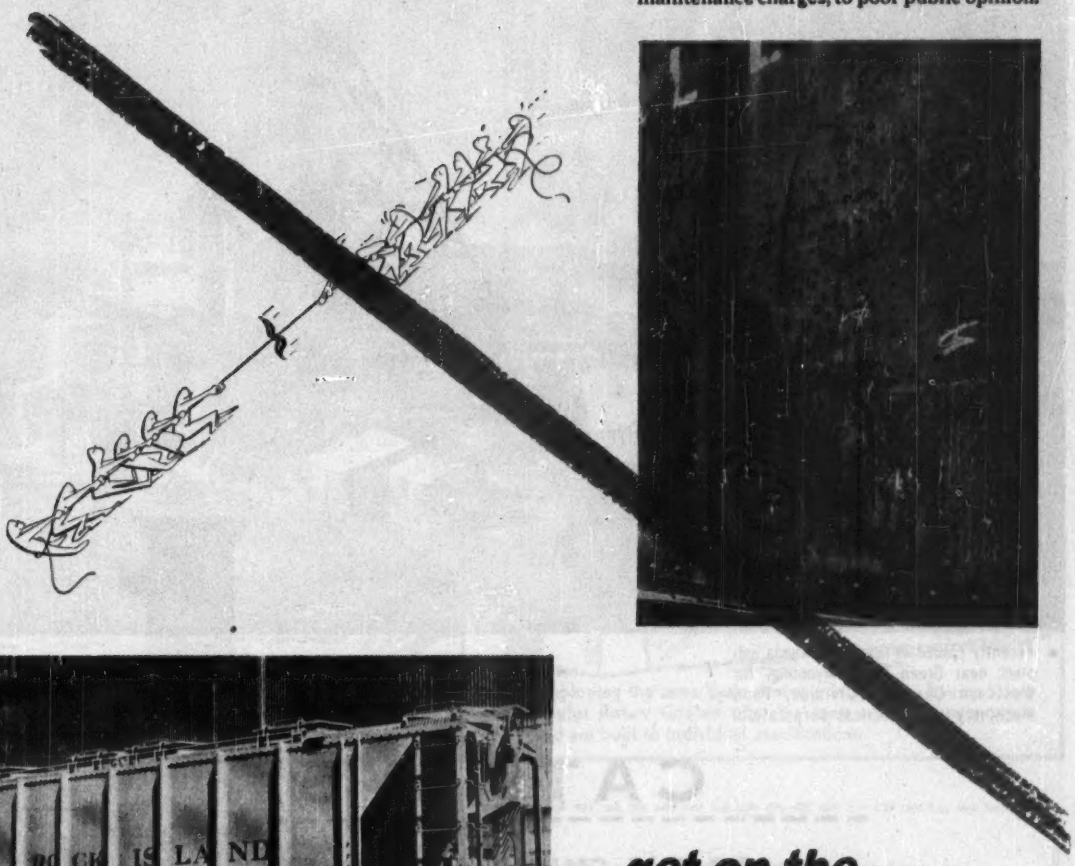
Available in sizes from 75 hp to 250 hp, 410 cfm. to 1663 cfm., and with flange mounted, belted and coupled motors. Write for Bulletin 766. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

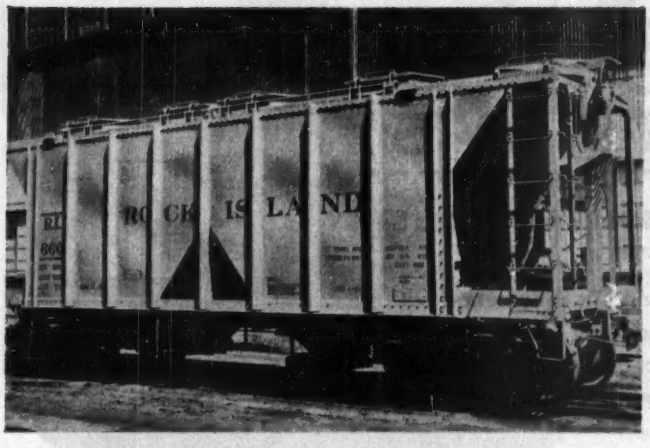
Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

get off the losing side!

Don't let this be your side of a coating story. Peeling, scaling paint exposes your equipment and your company to extra-heavy depreciation costs, to repair jobs and high maintenance charges, to poor public opinion.





...get on the side with coatings based on

Look at this car -- day in, day out under attack from rain, heat, cold, sunlight, corrosive cargoes and fumes, vibration, and pounding with sledge hammers to loosen loads . . . and *it keeps in good condition.* That's the kind of service VINYLITE Resin coatings give you.

They're tough, tight-sticking coatings that defy man's abuse and the ravages of the elements. They're just as serviceable on metal, masonry, or concrete.

Properly applied, coatings based on VINYLITE Resins won't crack, chip, peel or fade. They resist oil, grease, chemicals, brine, alkalies and most strong acids. No matter what you coat, wherever service is rough, VINYLITE Resin coatings have proved they can take it.

For a new folder giving case histories of equipment coatings, suggested BAKELITE and VINYLITE coating formulations, and a list of suppliers, write Dept. QS-46.

Vinylite
BRAND
RESINS

TRADE MARK

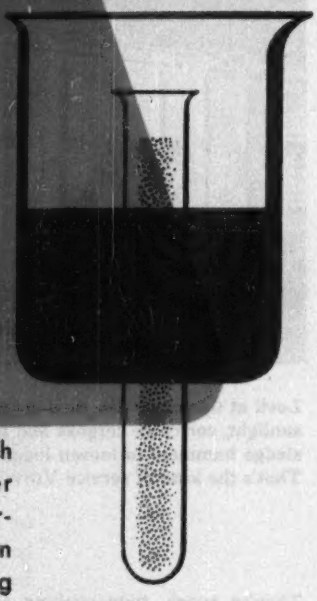
BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N.Y.

● Recently placed in operation—soda ash plant near Green River, Wyoming, for Westvaco Chemical Division, Food Machinery and Chemical Corporation.

CATALYST

TO THE CHEMICAL INDUSTRY

One of four facilities designed in conjunction with Westvaco engineers, this soda ash plant illustrates Bechtel Corporation's function as a "catalyst," helping to translate management decisions into production units.



BECHTEL

BUILDERS FOR INDUSTRY

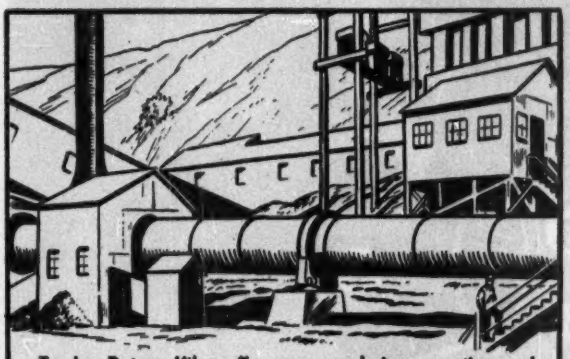
With full responsibility or in association with the client's staff, Bechtel services offer substantial advantages of experience, organization and equipment. The result is an economical solution to individual processing requirements in the shortest time.

BECHTEL CORPORATION

Los Angeles • **SAN FRANCISCO** • *New York*

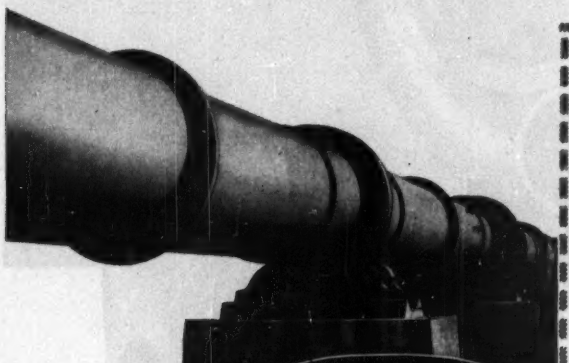
Worrying won't help!

You have to take action to stop expanding maintenance costs. With "Traylor-made" equipment, you can curb those high costs now.



Traylor Rotary Kilns offer many exclusive operating and maintenance features which were developed over the past 50 years on the basis of field experience. They are time-tested and proved for efficient processing of material.

Employing the same basic design principles as Traylor Kilns, Traylor Rotary Coolers offer the same operating economies and are built to individual specifications.



A Traylor LEADS TO GREATER PROFITS

TAKE action now to stop expanding maintenance costs. Write today for Bulletin 115 . . . get complete details and illustrations of Traylor's superior design and construction of equipment for the process industry.

Name: _____

Position: _____

Company: _____

Address: _____ State: _____

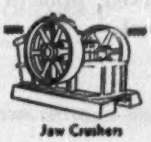
TRAYLOR ENGINEERING & MANUFACTURING CO.
561 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

Primary Gyratory Crushers

Rotary Kilns

Secondary Gyratory Crushers

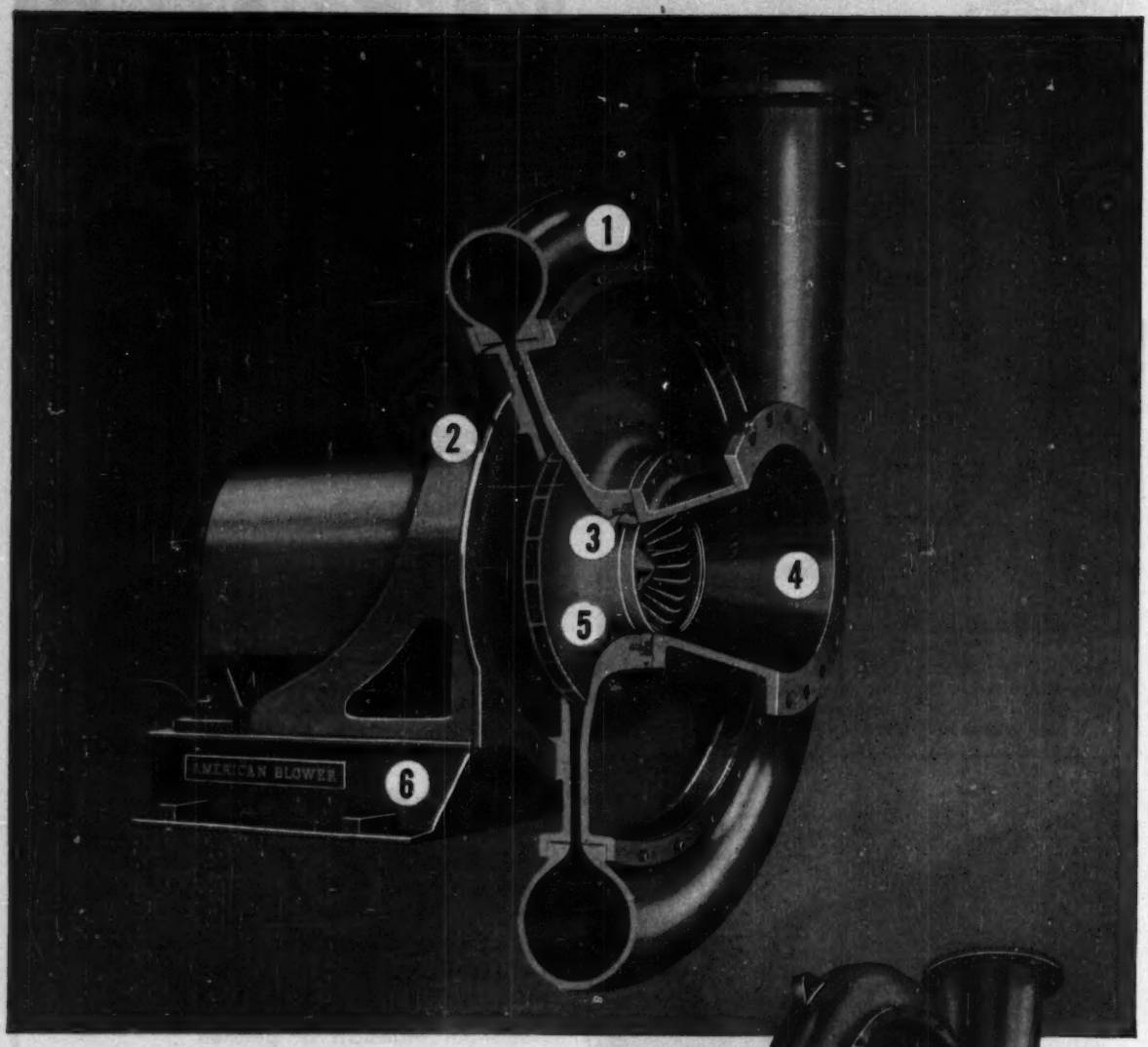
Ball Mills



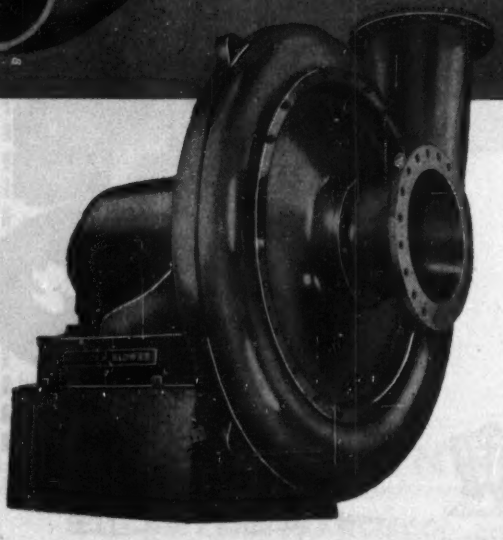
Jaw Crushers

Apron Feeders

American Blower...a great



In cutaway view above: (1) Improved scroll-shaped casing design results in increased compressor efficiency. (2) Unobstructed, long diffuser passage converts velocity energy into pressure; provides quiet operation. (3) Annulus packing minimizes recirculation of gas around impeller inlet. (4) Removable inlet nozzle assures accurate alignment of annulus packing when assembled with impeller. (5) Aero-dynamic design of impeller blades results in high efficiencies, long life. (6) Welded steel baseplate is "stress relieved" prior to machining—assuring maintained alignment.



name in air handling, *offers you*

An outstanding line of centrifugal compressors

Single stage design. Sizes from 30 to 600 HP.
Pressures from 1¼ to 3¾ lbs.

If your job calls for delivery of large volumes of air or gases, dependable American Blower Single Stage Centrifugal Compressors are just the ticket.

They're compact, require minimum foundations, are adaptable to all types of drives — electric motor, turbine or engine.

Except for the bearings, no other parts come in contact with each other — holding maintenance to an absolute minimum. Air or gases do not become contaminated since no internal lubrication is required.

Prior to shipment, each American Blower compressor is thoroughly tested in accordance with the A.S.M.E. Power Test Code for Centrifugal Compressors and Exhausters.

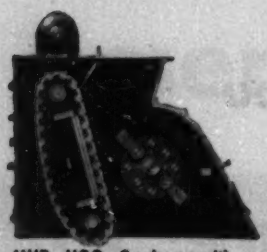
If you'd like complete, concise technical data, consult the nearest American Blower Branch Office or write us for Bulletin 109.

Whether you need equipment for heating, cooling, ventilating, air conditioning, vapor absorption, fume removal, dust collecting, mechanical draft, heat transfer or smooth power transmission thru Gyrol Fluid Drives — American Blower manufactures a complete line of products to meet your requirements. Helpful technical literature is available on each product.

AMERICAN **BLOWER**

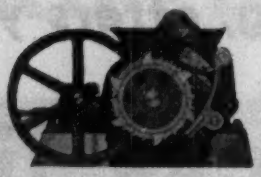
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

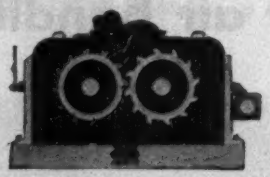
Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS

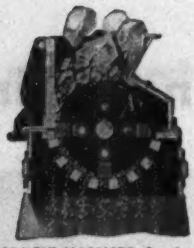


MUD HOG Crushers with traveling breaker plate

Single Roll, Double Roll and FLEXROLL Crushers



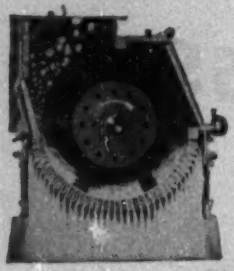




MIRACLE HAMMER Crushers for large capacities — large feed

HIGH CAPACITY UNIFORM REDUCTION

A Complete Line of crushers, pulverizers, shredders for reducing all classes of material to desired size. Several types are shown.

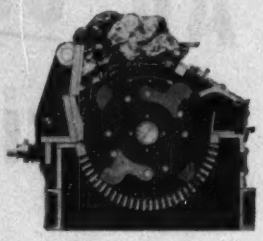


Type A Crusher with swing hammers

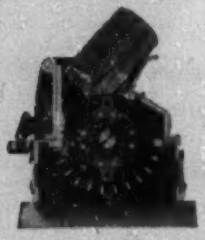
Built for specific applications — in a wide range of sizes — some with metal catchers — to suit capacity requirements.

Our modern test laboratory enables us to determine the proper type and size of machine best suited to the need in advance of expenditure or installation. Sample of material may be furnished, if desired, with results kept in strict confidence.

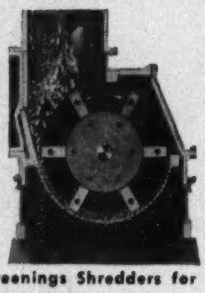
CRUSHER DIVISION



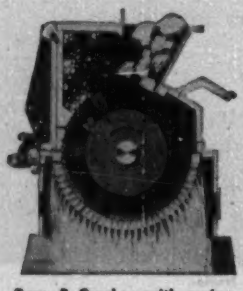
FLEXTOOTH and Rotary Ring Crushers



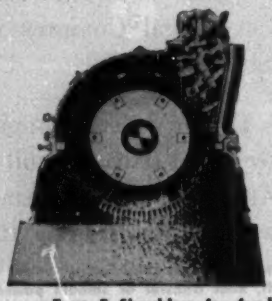
Bale Breakers, Pulp Lap and Crude Rubber Shredders



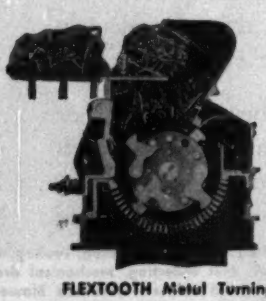
Screenings Shredders for chips, sewage, etc.



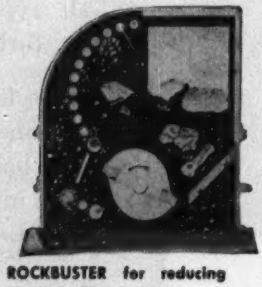
Type B Crusher with swing hammers



Type E Shredders for food or wood products



FLEXTOOTH Metal Turnings Crushers



ROCKBUSTER for reducing hard, friable material

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

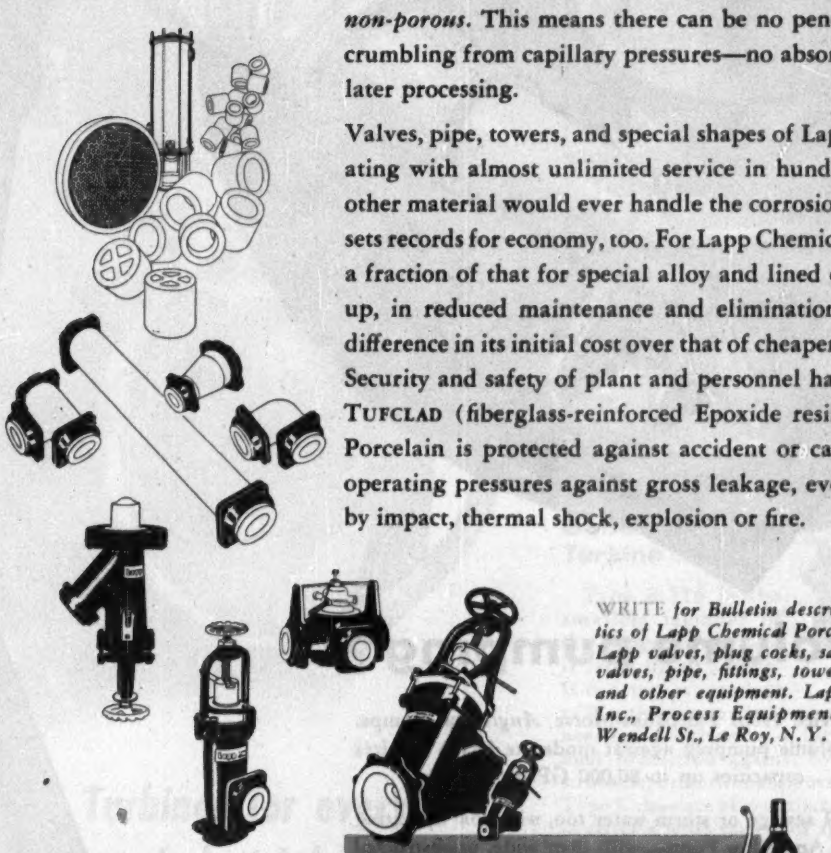
. . . IT'S A JOB FOR JEFFREY!

Nothing defies corrosion like

PORCELAIN

Chemical inertness to acids of all concentrations is a characteristic of porcelain. And, as made by Lapp, it is pure, dense, hard, close-grained, homogeneous and *non-porous*. This means there can be no penetration of Lapp Porcelain—no crumbling from capillary pressures—no absorption of liquids to contaminate later processing.

Valves, pipe, towers, and special shapes of Lapp Chemical Porcelain are operating with almost unlimited service in hundreds of installations where "no other material would ever handle the corrosion problem." At cost figures that sets records for economy, too. For Lapp Chemical Porcelain equipment costs but a fraction of that for special alloy and lined equipment—and quickly makes up, in reduced maintenance and elimination of need for replacement, the difference in its initial cost over that of cheaper "corrosion resistant" materials. Security and safety of plant and personnel haven't been overlooked. With TUFCLAD (fiberglass-reinforced Epoxide resin armor) Lapp Chemical Porcelain is protected against accident or carelessness. It will hold operating pressures against gross leakage, even though damaged by impact, thermal shock, explosion or fire.



ANGLE AND Y-VALVES ½" TO 6"
PLUG COCKS 1", 1½", 2"
FLUSH VALVES FOR 3", 4", 5"
TANK OUTLETS
PIPE AND FITTINGS ½" TO 8"
TOWERS 12", 18", 24"
RASCHIG RINGS ⅜" TO 3"
TOWER PLATES

WRITE *for Bulletin describing characteristics of Lapp Chemical Porcelain, and listing Lapp valves, plug cocks, safety valves, flush valves, pipe, fittings, towers, raschig rings and other equipment. Lapp Insulator Co., Inc., Process Equipment Division, 150 Wendell St., Le Roy, N. Y.*

Lapp
CHEMICAL PORCELAIN

for BIG volume pumping?

You get a new high in service from Fairbanks-Morse *Angleflow* Pumps. They're designed for BIG volume pumping against moderate heads — sizes range from 8 to 54 inches . . . capacities up to 80,000 GPM.

You can move big volumes of sewage or storm water too, with *low* operating and maintenance costs. These Angleflow Pumps, with their wide, unobstructed impeller and volute passages, are especially suitable for handling debris-filled water.

For information, see your local Fairbanks-Morse Pump Engineer . . . or write Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

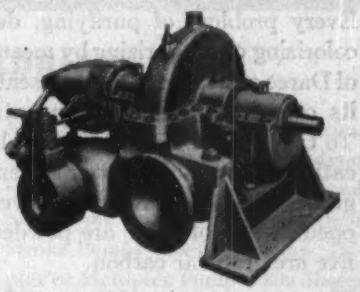
PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY
RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

"This engineered oil cushion prolongs turbine bearing life"

Tests on standard ring-oiled bearing construction show that oil being flung off at high shaft speeds was lost to lubrication. An exclusive Westinghouse-designed Wiping Shield solves this by directing the oil back on the bearing. This results in more oil on the bearing . . . enabling it to stay in service for extremely long periods and stand up under severe running conditions. Soundness of this reinforced oil cushion was proved right in the bearing itself by imbedding thermocouples throughout the babbitt. When measured during exhaustive floor tests, temperatures showed total elimination of "hot spots".

This important refinement exemplifies the thoroughness of Westinghouse continuing program to build more and more efficient prime movers. A program based on—over 50 years' experience in turbine design and manufacture . . . research and development skill . . . complete production facilities . . . full-scale floor testing . . . quality components . . . wide range of capacities, from 1 hp to the largest made . . . and expert field and application ability.

The Type E General-Purpose Turbine



Type E-116 is the smallest member of the Type E family and is rated up to 500 hp. It is a typical product of Westinghouse engineering progress and includes these important features: dual protection against overspeed; weather-resistant construction; centerline support and interchangeable parts. Other Type E sizes are also available, with ratings through 1500 hp, to cover a wide variety of applications.

Consult your Westinghouse Sales Representative who is well equipped to assist in specifying the correct size and accessories for maximum economy, operating efficiency and dependability; or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-50553

Turbines for every industrial use

YOU CAN BE **SURE**...IF IT'S

Westinghouse

DARCO Digest

DARCO DEPARTMENT • ATLAS POWDER COMPANY
Darco General Sales Offices—60 EAST 42nd STREET, NEW YORK 17, N. Y.
ATLAS POWDER COMPANY, CANADA, LTD., BRANTFORD, CANADA

CHOOSE THE GRADE OF DARCO THAT'S BEST FOR YOUR APPLICATION

Sample cans of Darco for your laboratory tests

Every problem of purifying, decolorizing or deodorizing by means of Darco activated carbon presents its own individual requirements. To take care of these varied applications, a total of twelve different grades of Darco have been developed. Seven of these are powder; five are granular carbon.

The various grades of Darco differ in type of activation, particle size, and secondary physical properties. To match these variables with the variables presented by a particular application is a rather complex process.

How, then, do you select the most effective grade?

If you let us know some of the vital facts about your job, we can generally narrow the choice down to two or three grades. Specifically, the information that is needed to make the choice falls into these classifications:

Liquor: is it aqueous or non-aqueous; liquid or solid at room temperature; pH; boiling point; viscosity; affected by heating?

Impurity: nature and amount?

Application: decolorizing, deodorizing, or general purification?

Send us this information, and we'll mail you free samples of several grades of Darco. The optimum grade, minimum dosage and best treatment conditions are then determined by simple tests in your laboratory.

For a brief description of evaluation methods, write for a copy of the booklet, "8 Ways to Get The Most From Darco."

Darco activated carbon is made from materials of vegetable origin

Activated carbon can be made from practically any material that has a high carbonaceous content.

Darco activated carbon, however, is entirely vegetable in origin. Much of it is made from Texas lignite, which the Germans know as brown coal. Some grades are derived from wood sawdust. Darco G-60, the premium-purity grade, is manufactured from high quality wood charcoal.

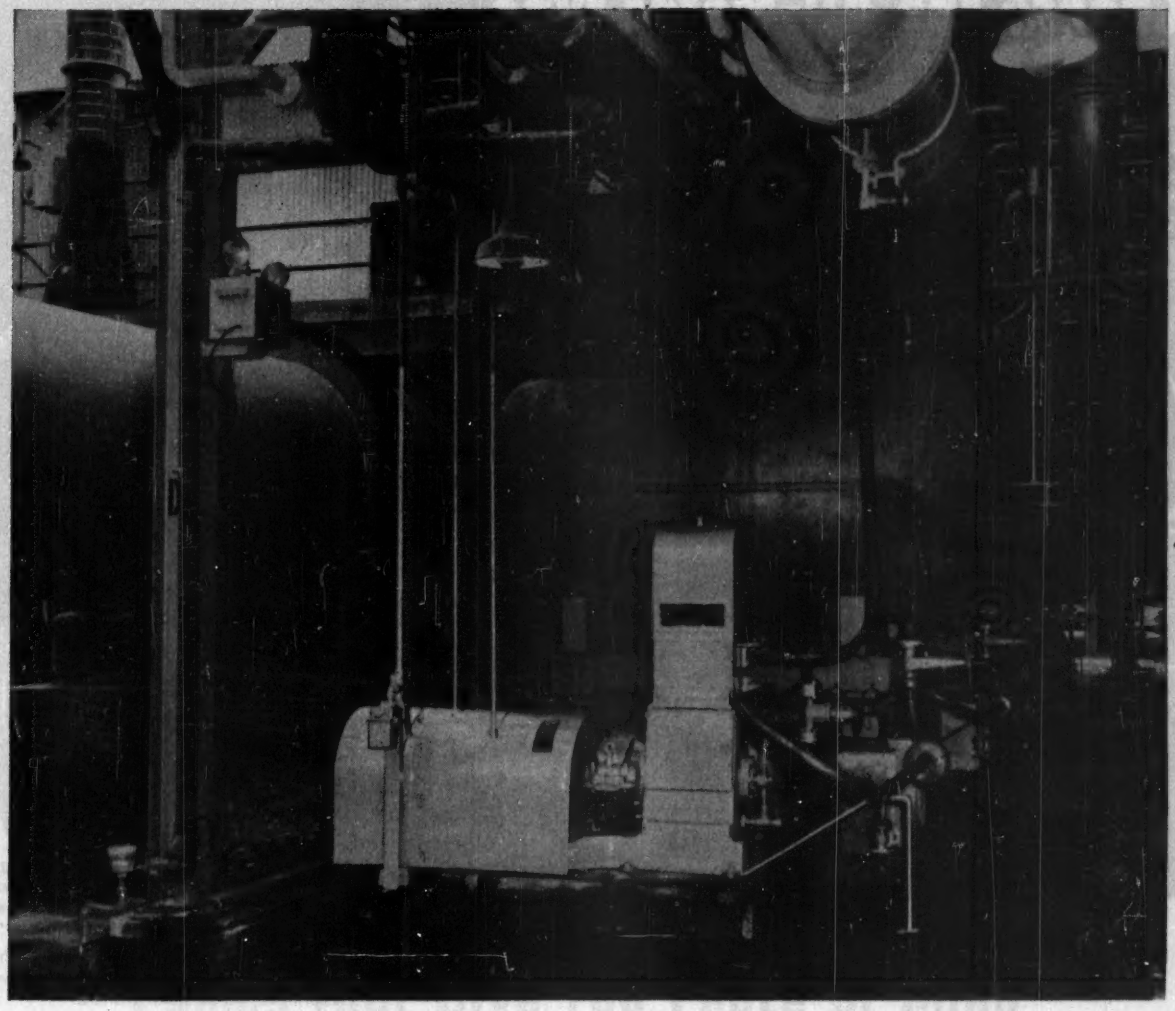
The activation process used for making Darco consists of heating to high temperature under mild oxidizing conditions. Following this, all extractable contaminants are thoroughly removed by successive washing in acids and water.

DARCO'S low retention saves valuable product

Any activated carbon used for purification will hold back some of the liquor being processed. The amount of liquor that stays in the filter cake can represent a sizeable economic loss. When dealing with pharmaceuticals, edible oils and chemicals which have a high cost per pound, it pays to choose a carbon that provides the minimum retention loss.

Darco G-60 is recommended for applications where retention loss can prove costly. Because it often holds back only half as much product in the cake as other carbons, Darco G-60 frequently pays for itself in greater yield at the filter press.

If you're purifying valuable product, we suggest that you send for a sample of Darco G-60. Test it thoroughly in your own laboratory. Compare its retention against any other carbon. You'll probably find that this premium grade will prove the most economical for your application.



Another Chemical Pumping Job—handled by ALDRICH

This scene is the plant of a leading manufacturer of explosives, where the Aldrich Triplex Pump pictured in the foreground pumps nitric acid at the rate of 185 lbs. per minute against 400 psi maximum pressure.

It's one of many jobs Aldrich Pumps are called upon to do in the chemical industries. These versatile pumps are ideal wherever applications involve corrosion, abrasive materials, high viscosity or high pressure. In addition to nitric acid, among the many liquids handled by Aldrich Pumps are caustic solutions, fatty acids, acetic acid, aqua ammonia, anhydrous ammonia, as well as liquids encountered in the petroleum refining, petroleum chemical and other industries.

Several types of Aldrich Pumps are available to meet your specific needs. For automatically controlled delivery Aldrich-Groff "POWR-SAVR" Pumps can handle any free-flowing liquid at discharge pressures from 300 to 15,000 psi and are available in six sizes—from 2" to 6" stroke and from 5 to 125 bhp. (For information, write for Data Sheet 65.) For medium to high pressure service you may need one of the many Aldrich Constant Stroke Pumps—the Direct Flow Triplex or Multiplex Pump (Data Sheets 64, 64A, 64B).

Take advantage of our broad experience in building pumps for the chemical industry and let us make specific recommendations to meet *your* chemical needs. No matter what your problem, we welcome your inquiries or requests for literature.

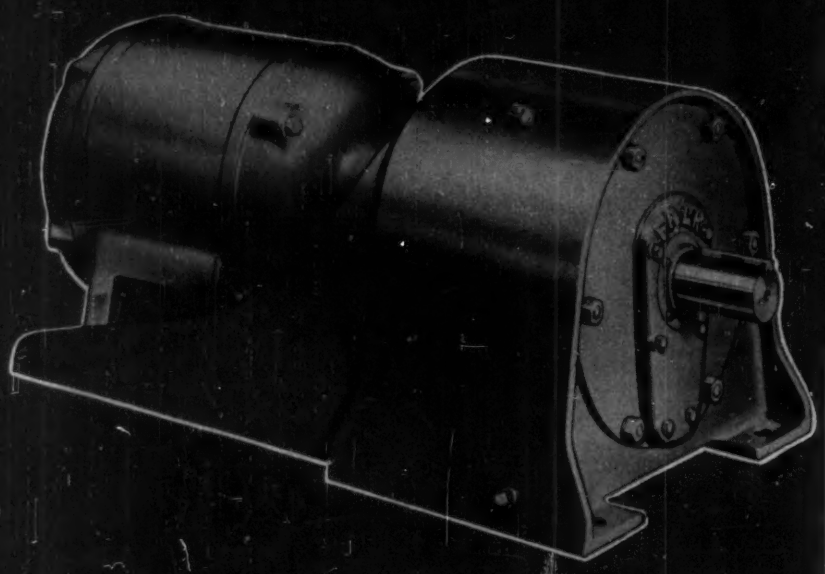
The Aldrich Pump Company

3 GORDON STREET • ALLENTOWN, PENNSYLVANIA

Representatives in Principal Cities

ALDRICH

Choose the All-Motor type,



...with complete foot-mounted motor of ANY make ANY type ANY speed

Its exclusive, superior features mean LONG-RANGE ECONOMY!

You get more for your money in a FALK all-steel, All-Motor type Motoreducer. Here is the *only* compact motorized reducer with a separate foot-mounted, resilient Steelflex coupling-connected, standard motor without modifications! It accommodates *any* make, type, or speed of motor within the AGMA rating of the unit. Ratio can be changed within torque capacity of unit without modifying motor.

The simplified construction of the FALK All-Motor type Motoreducer means real long-range economy. Motors or reducer units can be quickly and easily interchanged from one line or plant location to another. Fully standard replacement motors from manufacturers' field stocks are always available without costly delivery delays or special motor or shaft modifications.

When you choose a FALK All-Motor type Motoreducer, you get the utmost in design, versatility of performance, and utility—plus the greatest possible dollar-for-dollar value throughout its traditionally long life... Available in any standard ratio from factory and distributor stocks throughout the country. Write for Bulletin 3104.

FALK ...a good name in industry

THE FALK CORPORATION 3001 W. Canal St. Milwaukee 8, Wis.

Every FALK motoreducer has these "IN-BUILT" FACTORS

1 **All-steel Housings.** Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

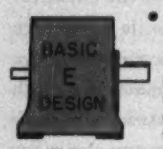
2 **Streamlined inside and outside.** Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

3 **Sealed Housings.** Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splashproof, leakproof, dustproof.

4 **Positive Lubrication.** Large sump capacity ...oil-tight construction assures clean lubricant...direct dip of revolving elements provides positive lubrication at all speeds.

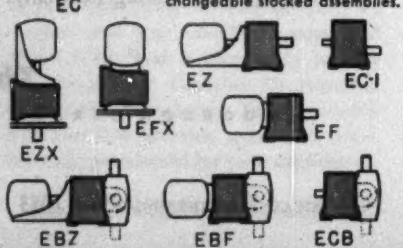
5 **Wide Speed Range.** Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

6 **Precision Gearing.** Heat-treated alloy steel, precision cut and shaved helical gearing throughout...quiet-operating crown shaved pinions...taper bored gears for easy ratio changes.



EC

The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.



WRITE FOR BULLETIN 3104

Pumps that Give You Peace of Mind

Handling a coagulating solution calls for pumps that need no excuses. If performance falters, even briefly, expensive troubles can result. And if the pumps are not metallurgically exact, there is the possibility of staining the end product with consequent destruction of value.

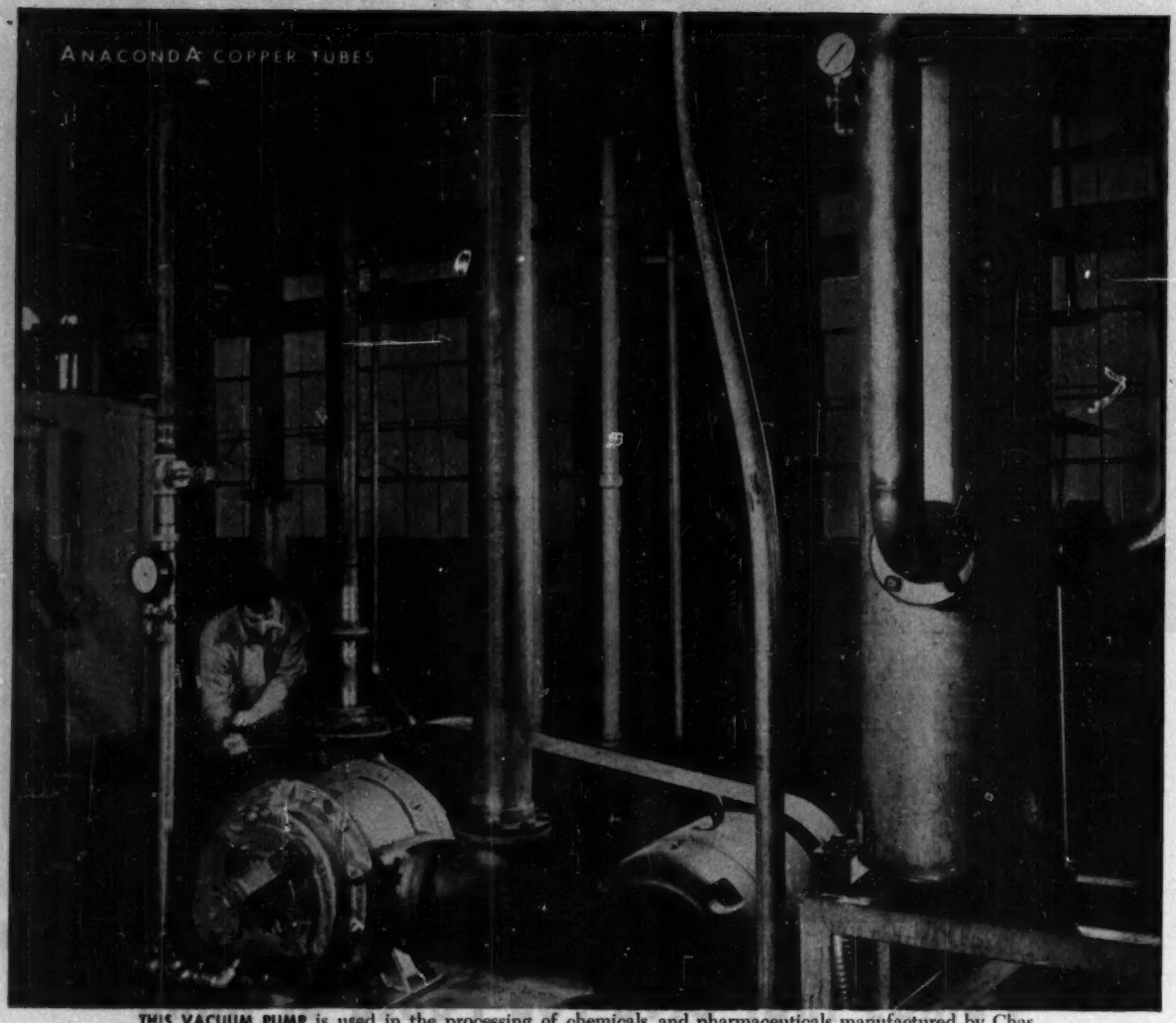
So this manufacturer turned to LaBour, because LaBour pumps have an unequalled reputation for staying on the job. Moreover, LaBour's nearly 30 years of experience in serving the chemical industry has created foundry methods that assure meticulous adherence to metallurgical specifications. The pumps in the picture are non-priming, and the hydraulic job (300 G.P.M. against a 70 foot head) isn't difficult, but this buyer wasn't willing to take a chance with anything less than a LaBour.

Can you afford to take chances on your pumping jobs? When you specify LaBour, there will be no grounds for anyone to question your judgment, no matter what happens. You'll get true pumping economy as well as peace of mind when you put LaBour's on the job.

ORIGINAL MANUFACTURERS OF THE SELF-PRIMING CENTRIFUGAL PUMP

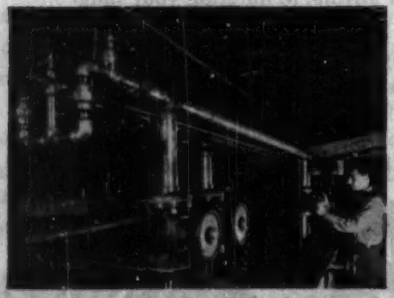
LABOUR

THE LABOUR COMPANY, INC. ★ Elkhart, Indiana, U.S.A.



THIS VACUUM PUMP is used in the processing of chemicals and pharmaceuticals manufactured by Chas. Pfizer & Co., Inc. 4-in. copper tubes and 6-in. red brass pipe are used for suction and discharge lines.

Your plant piping will last longer —can cost less when it's copper



THESE CHEMICAL PROCESS LINES of 1¼-in. and 2-in. copper tubes in the Chas. Pfizer & Co., Inc. plant use both copper solder-type and S.P.S. bronze fittings joined by silver-alloy brazing.

NOT ONLY the first cost, but how long it will last and how much it costs to install are the measures of true industrial piping costs.

Where corrosion shortens piping life, where rust and scale form to restrict flow and increase pumping costs, there you should consider copper's corrosion resistance and immunity to rust—properties that endow copper piping with its long life.

Lightweight copper tubes are far less costly to erect; when used with solder type fittings, they cost far less to install than heavy, threaded pipe. In fact, it is not unusual for labor savings to bring the installed cost of a copper tube, solder fittings system below that of rustable piping.

For examples of the wide use of copper in industrial piping and for detailed information on ANACONDA Copper Tubes and Solder Type Fittings, let us send you a copy of Publication C-24. Write to *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* 8396

for copper piping call an

ANACONDA®

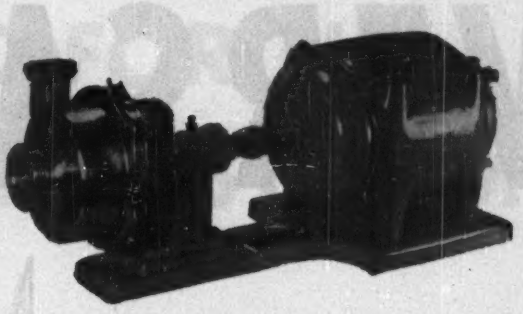
Distributor

Here are the PUMPS that will handle ANY PRODUCT that will flow to them . . .

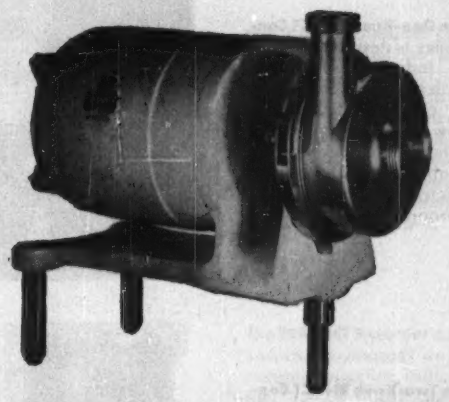
ANY product that will flow to them can be handled efficiently and economically with Tri-Clover non-agitating centrifugal pumps. Illustrated are three of the many Tri-Clover pump models which are used for dairy and food processing, brewing and bottling, chemical and general industrial applications.

Designed for efficient liquid transmission and low cost maintenance, these pumps feature patented screw type impellers with sanitary impeller clips, inert carbon seals easily removed for cleaning, streamlined lightweight heads with a minimum of parts, and the exclusive Tri-Clamp casing construction which permits fast, easy pump assembly or disassembly.

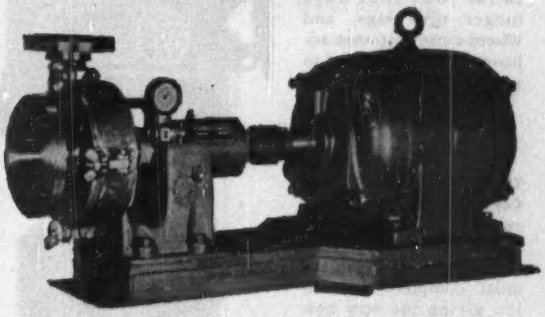
Tri-Clover's exclusive developments are the result of over 30 years of specialized engineering experience and thorough knowledge of liquid handling. Let our engineering staff work with you in solving your pumping problems.



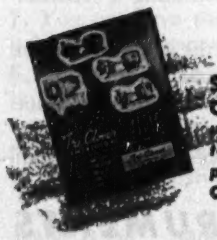
This model has been designed for the non-agitating, efficient pumping of milk, food products such as diced carrots, cream style corn, tomatoes, applesauce, relish and beverages. It is also practical in breweries and for the pumping of drugs and chemicals in solution.



Designed for very efficient operation at 1800 and 3600 RPM, and especially where high speeds are required, through heaters, coolers, filters, clarifiers, etc. The 3600 RPM model is especially applicable in the dairy industry, where high head and low capacity are essential and for handling low and medium viscosity liquids in the food processing industry.



Here is the model that is in demand to pump Latex, water, brine, light oils, chemicals, paints, brewery products, and liquids in the food processing field where lines are of heavy I. P. S. type. This model offers quick disassembly features for ease in cleaning.



SEND FOR THE TRI-CLOVER PUMP CATALOG—*One of the most complete, useful pump catalogs ever compiled. Contains engineering data on all types of pump applications. Write for your copy of Catalog 250 today.*

Tri-Clover®
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

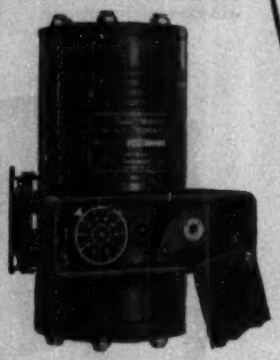
FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

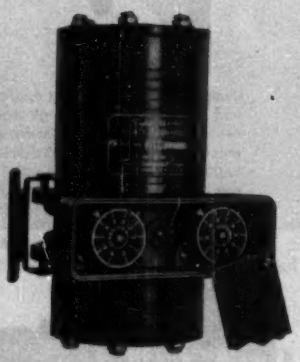
P188

VERSATILITY

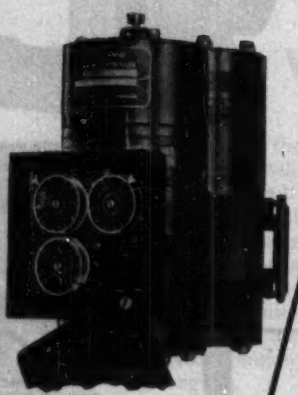
PLUG-IN CONTROLLERS



The One-Knob BI-ACT Controller is designed for use in industrial processes with short time lags, such as close-coupled liquid flow, fast pressure and comparable temperature problems. Combines simplicity of adjustment and economy.

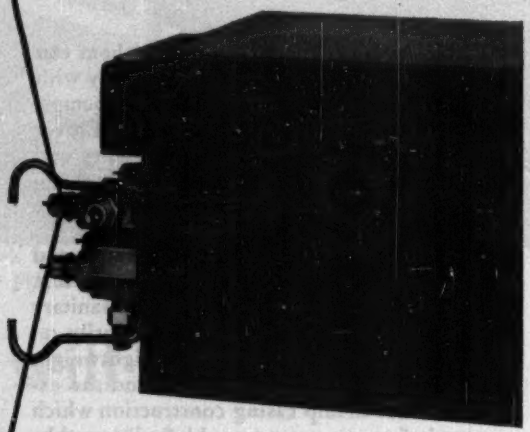


The Two-Knob BI-ACT Controller will cover the full range of reset rate and proportional response adjustments. This makes it more satisfactory for those jobs that have longer time lags, and where close response adjustments are essential to good performance.



The Brand New TRI-ACT Controller combines all 3 response adjustments (gain, reset rate and Pre-Act response). It is the most complete controller, giving the very best control on the more complex processes, particularly those with long time constants, and load changes requiring both derivative and reset adjustments. Gives faster recovery on load changes; start-up without overpeaking; the benefits of automatic reset without its evils.

And it's a versatility born of experience, proven sound and developed to a high point of efficiency. The key to this versatility is the Taylor Plug-In Feature, which enables the process engineer to quickly select or change both his controllers and receivers to meet control or processing requirements as they develop. He can use the One Knob or Two Knob BI-ACT* or TRI-ACT* Controllers, depending on the quality of control required or operating conditions encountered; he can switch, in seconds, from an indicating to a recording receiver, with or without automatic to manual features, or with cascade (pneu-



HERE'S WHAT *VERSATILITY* MEANS TO YOU!

1. You can plug in shop-adjusted instruments.

2. You can efficiently analyze process difficulties by quickly substituting a recorder for an indicator.

3. You can switch from the simplest to most complete controller in a matter of seconds.

4. Down time is kept to a minimum, since both controllers and receivers plug in.

5. Maintenance is unnecessary in the area of

TAYLOR INSTRUMENTS

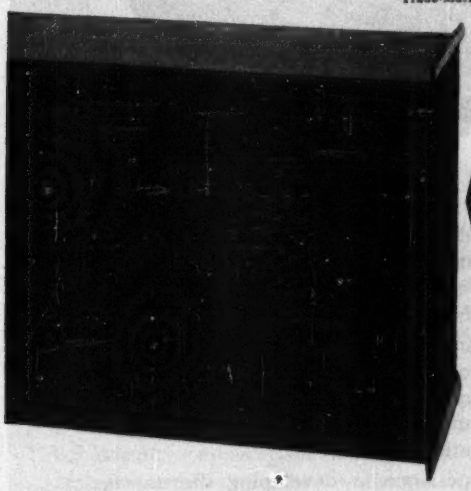
IS ONE WORD FOR THE TAYLOR TRANSET® SYSTEM!

matic set) features. In other words, "second thinking" is both practical and economical.

Both the Controllers and the Receivers have been designed to take advantage of the speed, responsiveness and high accuracy of the TRANSAIRE* transmitters—for temperature, pressure or differential pressure. Ask your Taylor Field Engineer how you can profitably use the Taylor Transet System; or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

*Trade-Mark



the panel. Checking can be done in the shop where full facilities are available.

6. One standard panel cut-out (5 1/32" x 4 5/32") accommodates 12 different forms of recording and 11 different forms of indicating receivers.

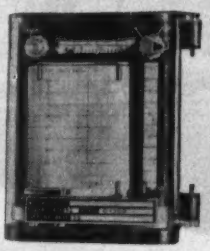
7. You conserve panel space without impairing maintenance facilities.

8. Self-purging case for all receivers is especially appreciated in corrosive or dusty atmospheres.

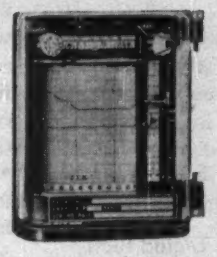
9. Your plant can be kept running smoothly, without expensive shutdowns.

PLUG-IN RECEIVERS

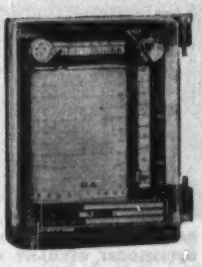
The TRANSET Indicator has all the features of the TRANSET Recorder, but gives no chart record. Gives direct indication of both set point and process variable on single, easy reading 3 1/2" dial. *Mounts in same size panel opening as TRANSET Recorder.*



The TRANSET Recorder has automatic-manual unit, remote set-point indicator. 30 day linear chart, 3 hours visible. Chart reads from left to right on rectilinear coordinates, as an engineer would normally plot variables for study.



The Single Duty Bi-Record Receiver can record a related variable in addition to that under control. For example, in flow measurement it records static pressure as well as differential pressure.



The Pneumatic Set Receiver (Cascade) combines in *one* case without additional panel space the facilities for pneumatic set, automatic control and automatic to manual feature.

MEAN ACCURACY FIRST

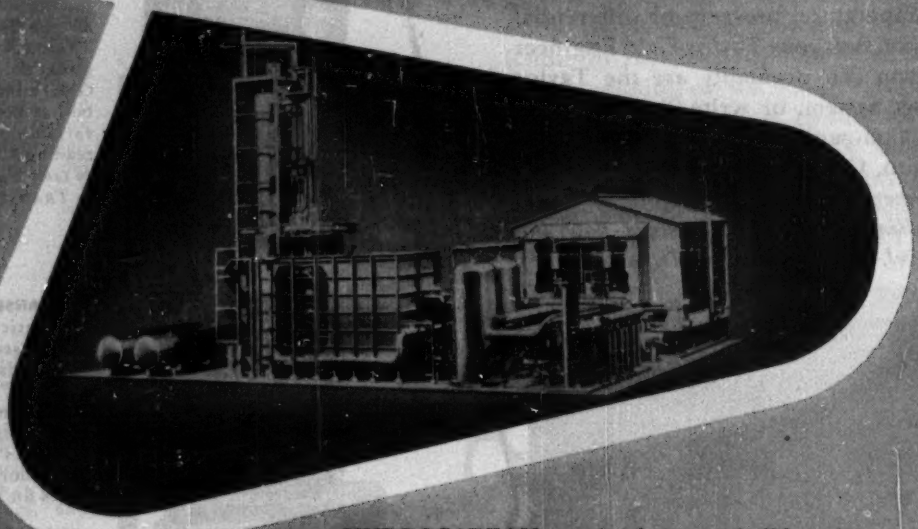
HYDROCARBON

Planned Processing for Profit

low cost

O_2-N_2

tonnage plants



Oxygen and Nitrogen are now being produced at low cost—in any quantity—at any purity—at any pressure—opening entirely new concepts in the fields of:

- Partial oxidation
- Ammonia
- Methanol
- Acetylene
- Solid fuel gasification
- Liquid fuels
- Steel
- Petrochemicals

HYDROCARBON—as the foremost builder of tonnage oxygen plants—has placed in successful operation units ranging in capacity to over 1,000 tons per day—including the *three largest* in the world.

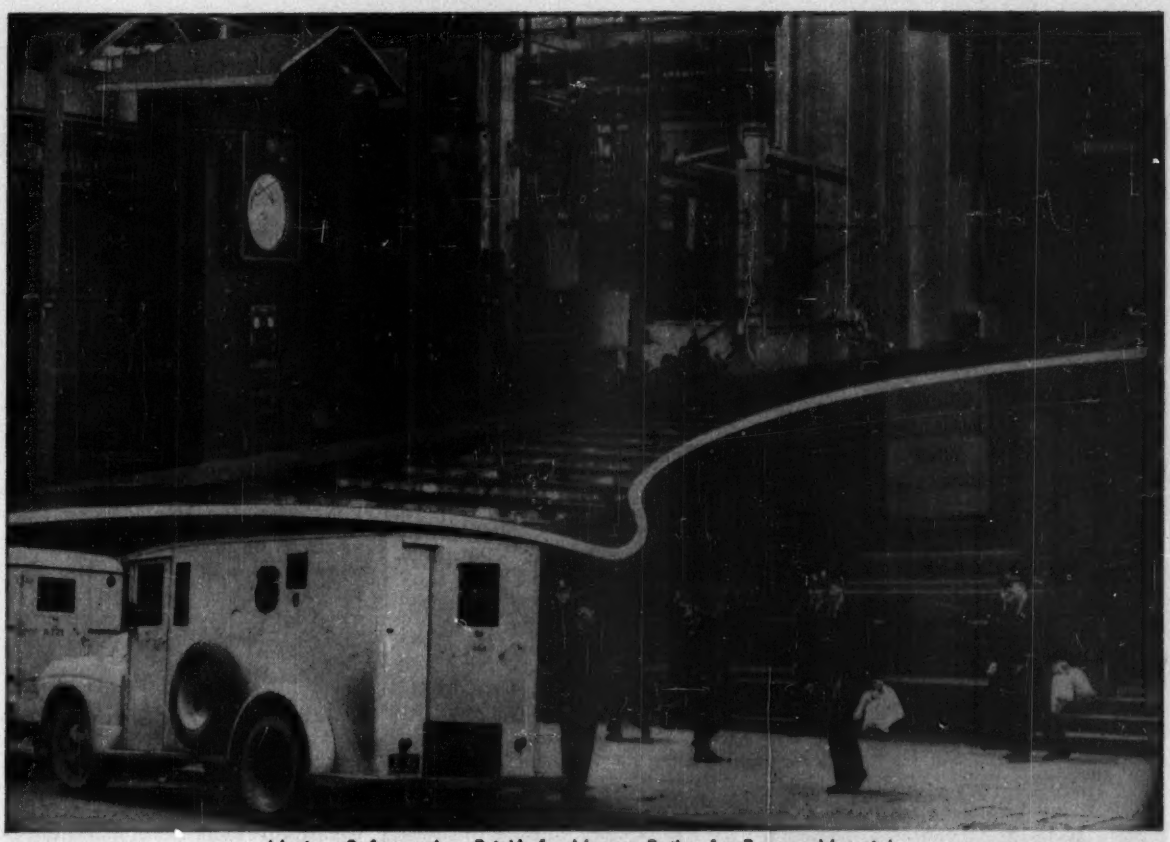
Hydrocarbon plants are characterized by low power consumption • no chemical purification or pre-drying of air feed • improved low temperature equipment • all aluminum and steel welded construction • completely safe operation.

Hydrocarbon experience in developing the use for oxygen and nitrogen in many applications, and in the design and construction of air separation plants, is at your disposal. Let Hydrocarbon discuss with you the profitable use of oxygen and nitrogen in your processes.

HYDROCARBON RESEARCH, INC.
115 Broadway, New York 6, N. Y.
Cable: Hydrocol

HRI
PLANNED PROCESSING FOR PROFIT

TRENTON, NEW JERSEY—Hydrocarbon Research, Inc., Development Laboratory, P. O. Box 1419.
PARIS, FRANCE—Hydrocarbon Engineering, S.a.r.L. 44, Avenue des Champs-Elysées, Cable: Hydrocarbon.
DUESSELDORF, GERMANY—Hydrocarbon Mineraloel, G.m.b.H., 15-17 Fuerstenwall. Cable: Hydromin.
RIO DE JANEIRO, BRAZIL—General Heitor Pedroso, Rua da Quintanda, 20, Sala 801. Cable: Bispetro.
NEW DELHI, INDIA—A. R. Palit & Company, Sujan Singh Park, Post Box 671, Cable: Palitar



Modern Safeguards—Brink's for Money, Bailey for Process Materials

Are Your Process Materials Guarded As Well?

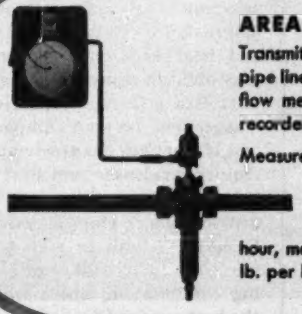
HERE'S HOW TO PREVENT SPOILAGE AND WASTE . . .

TO avoid waste of valuable process materials and finished products, process rates and conditions must be accurately measured and controlled. That's where Bailey Meters, Analyzers and Controllers can help you to improve the efficiency of your plant.

Take flow for instance. Bailey Meter Company offers a complete line of flow measuring and controlling equipment for applications ranging all the way from high pressure steam to low pressure gas. We measure flow in pipes, open channels, ducts, furnaces, smelters, kilns, ovens, dryers.

When you call Bailey Meter Company, you get the help of years of experience as well as recommendations from a wide selection of measuring and controlling devices.

Your local Bailey Engineer is as near as your telephone. He has the experience and the equipment necessary to set up an effective guard for your process materials. P-26



AREA TYPE FLOW METER

Transmitter goes into 1, 2 or 4 inch pipe line like a valve and transmits flow measurements electrically to recorder in remote location.

Measures oil and other clear liquids under static pressures up to 600 psi. Minimum range 0 to 1200 lb. per hour, maximum range 0 to 9600 lb. per hour.

BAILEY METER COMPANY

1054 IVANHOE ROAD
CLEVELAND 10, OHIO

Process Controls

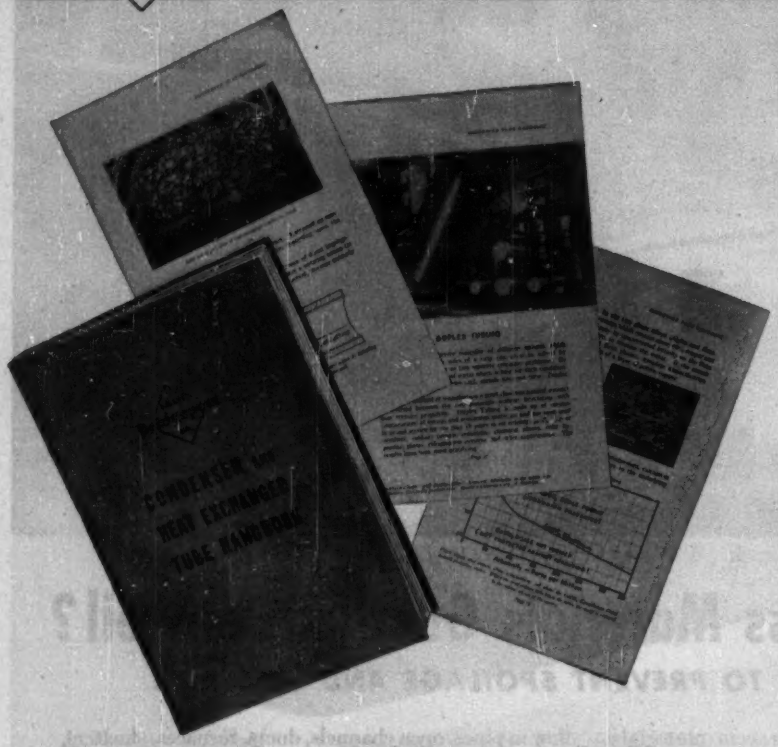
TEMPERATURE · FLOW
PRESSURE · LEVEL
GAS ANALYSIS · RATIO

BRIDGEPORT BRASS COMPANY

CONDENSER AND HEAT EXCHANGER TUBE EDITION

COPPER ALLOY BULLETIN

Bridgeport Brass Co. MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND.—IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTREAL



Announcing Bridgeport's New "Condenser and Heat Exchanger Tube Handbook"

For a better understanding of tube corrosion and maintenance problems

Which condenser tube alloy will give the best service life? To help solve this problem Bridgeport Brass Company has published a 156-page book which deals with the properties of available copper-base alloys for condenser tubes and their applications in the chemical, petrochemical, processing industries, power and marine fields.

Copper and copper alloy tubes are used for conveying corrosive liquids, exchanging heat, refrigeration, steam generation, reclaiming waste heat, evaporating, distilling, condensing, fractionating, extracting oil by means of solvents, etc.

Tubes carry many processing liquors, cooling waters, gases, acids, salts, bases, and organic compounds in water and other solvents. Each application requires careful study and sometimes experiments by trial in service.

Causes of Corrosion

The new book deals with corrosion problems. Much information is based on facts developed through laboratory corrosion research and field tests. Such data when correlated with actual operating experience are helpful in specifying which alloys will give best results for specific applications.

A large section of this book is devoted to corrosion from water which is probably the most widespread cause of corrosion. This subject has been covered from such angles as effects of alloy composition, water composition, pH values, soluble salts, dissolved gases, protective and nonprotective films, biofouling, oxygen concentration, impingement, foreign matter, dezincification, temperature, inhibitors, etc. Also dealt with are galvanic corrosion, causes of stress corrosion cracking, effects of vibration, and steam erosion-corrosion.

Time Saving Tables

The new book carries many tables, data and formulas. It covers heat transfer rates and general specifications. Especially valuable is the comprehensive table listing in compact form the comparative properties of standard condenser tube alloys including such items as alloy composition, mechanical properties, physical constants, thermal and electrical data, fabrication properties and specification numbers.

Considerable space deals with the care, handling and storing of condenser and heat exchanger tubes; methods of installation; cleaning and removal of old tubes.

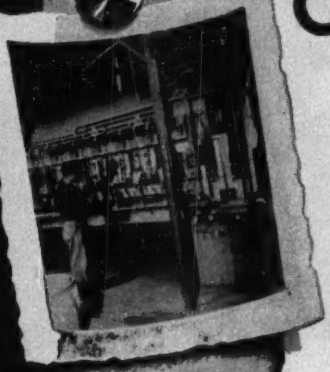
A portion of the book is devoted to various Duplex tubes combinations of ferrous and nonferrous alloys to offset the effects of two different corrosive media which may exist simultaneously on the outside and inside of the tubes. The applications of Duplex Tubing in industry are rapidly increasing.

How to Obtain a Copy

This valuable book can be of great help to engineers concerned with the selection of tubes, design, operation and maintenance of all types of condensers and heat exchanger equipment. You may obtain a copy by writing to Bridgeport Brass Company, Bridgeport 2, Connecticut, on your company stationery. If you have a corrosion problem, or require condenser and heat exchanger tubes, contact your nearest Bridgeport district office. Our Technical Service Department will be glad to help you select the correct alloy or Duplex Tubing combination which will give you the best service life. (101)

• Davison Bulletin •

CONFIDENTIAL CONFIDE



Confidential handling of catalyst problems is one of the reasons why Davison is the major catalyst producer in the country. Intricate coding plus restricted internal distribution keeps your catalyst secrets safe in Davison hands.

Davison recognizes that catalysts are the heart of chemical reactions, therefore, they are a most carefully guarded secret.

And Davison is equipped to meet the requirements of almost any given catalyst problem.

Bring your catalyst problem to Davison where you are assured of confidential handling. Call your Davison Field Service Engineer or write.

HYDROGEL
to induce microporosity

Manufacturers are using economic hydrogel to induce microporosity in rubber, resins and plastics. Material is a highly hydrated amorphous silica. The hydrogel, which is incorporated in rubber products, shrinks during drying operations thereby inducing porosity.

Davison hydrogel (SiO_2) x H_2O is colorless, translucent and available in semi-solid lumps or finely divided. The range of pH is 5.7 — 6.8.

For further information, samples, prices — call your Davison Field Service Engineer or write.

SOME STANDARD CATALYSTS AVAILABLE

V_2O_5 · K_2SO_4 on Silica

SiO_2 · Al_2O_3 Combination

Pt · SiO_2 Combination

$HgCl_2$ on Charcoal

Progress Through Chemistry

THE DAVISON CHEMICAL CORPORATION

Baltimore 2, Maryland

Producers of:
Catalysts, Inorganic Acids, Superphosphates, Phosphate Rock, Silica Gels and Silicofluorides. Sole Producers of DAVCO Granulated Fertilizers.

Please send me information on

☐ Product Data Sheet — Davison Hydrogel

☐ Specialty Catalysts

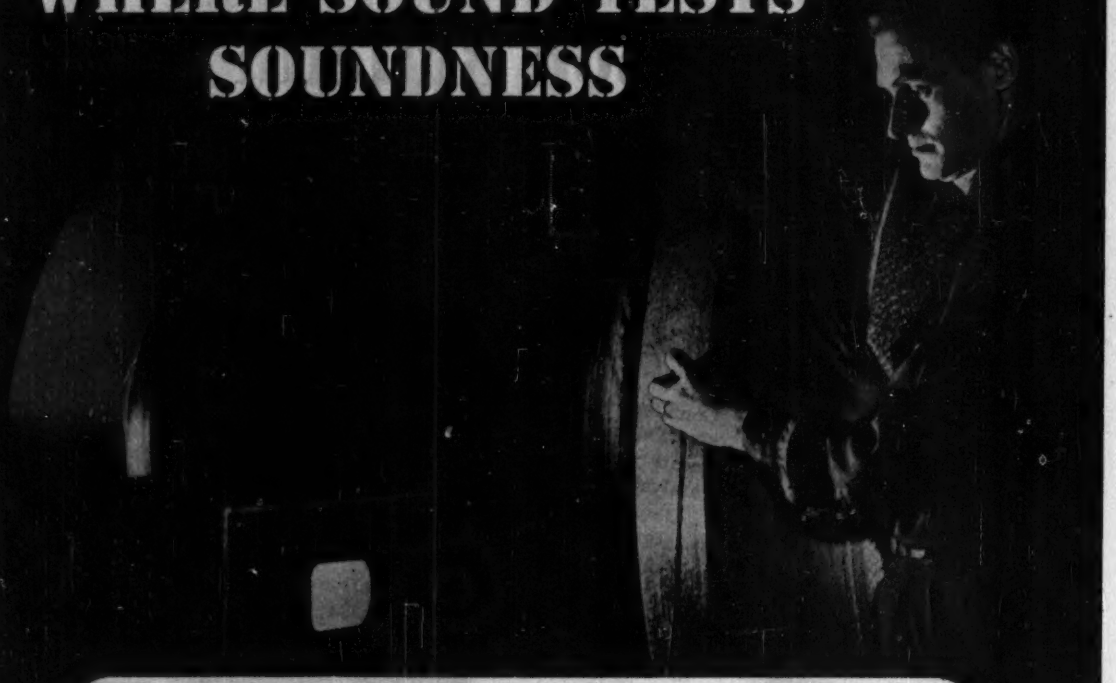
Name ..... Title .....

Company .....

Street .....

City ..... Zone .... State .....

WHERE SOUND TESTS SOUNDNESS



MIDVALE ULTRASONIC TESTS ASSURE QUALITY BEYOND THE CALL OF SPECIFICATIONS

- Pressure Vessels
- Forgings and Rings
- Hardened & Ground Steel Rolls
- Corrosion and Heat Resisting Castings
- Ordnance & Armor

Sound Waves "bouncing" up to ten million cycles per second seek out and find the smallest defect . . . assure quality forgings at Midvale . . . Ultrasonic waves able to penetrate thirty feet of the toughest steel.

In addition two million volt X-Ray unit . . . magnetic particle inspection . . . "black light" . . . dye penetrants are but a few of the many ways Midvale craftsmen safeguard unsurpassed quality.

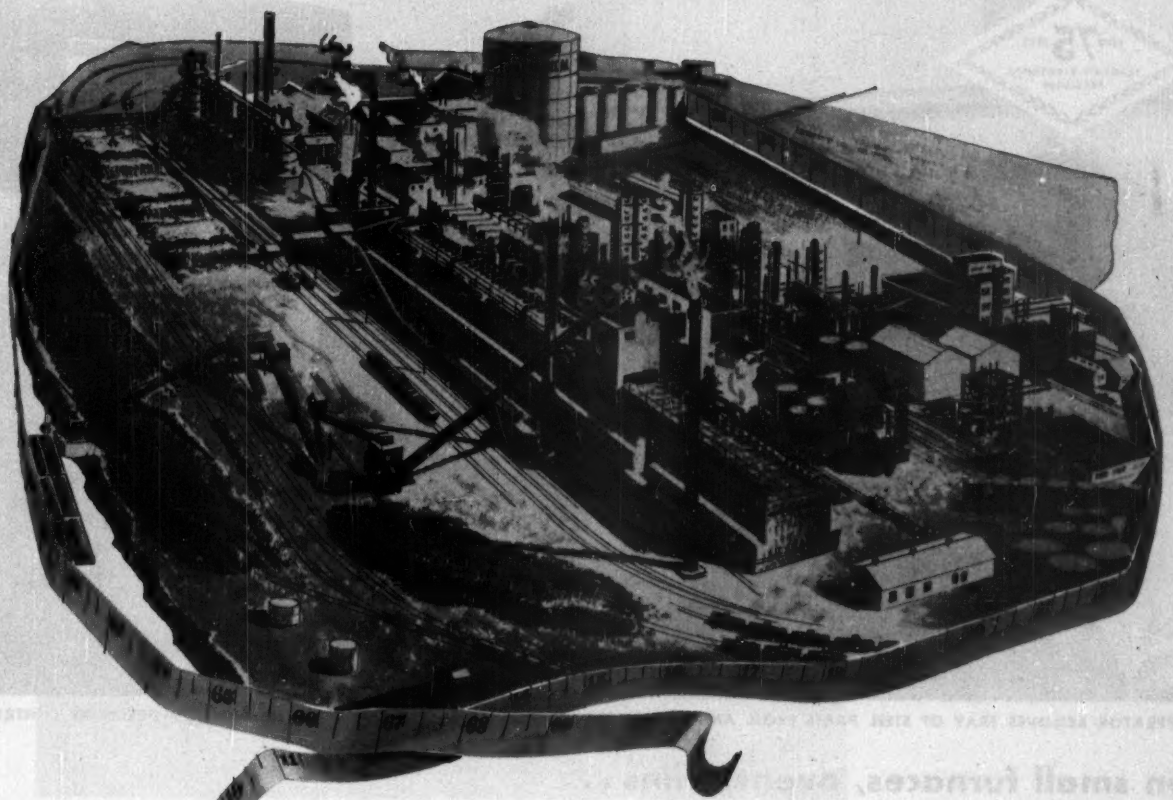
Midvale precision and performance can supply all your needs for heavy equipment in industry. Pressure vessels . . . hardened and ground steel rolls . . . weldless rings . . . forgings . . . heat and corrosion resistant castings. If the job is big, specifications exacting, peak quality a "must", you can rely on Midvale craftsmen.

THE MIDVALE COMPANY
NICETOWN, PHILADELPHIA 40, PA.
OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO

MIDVALE

Custom Steel Makers to Industry

PRODUCERS OF FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS



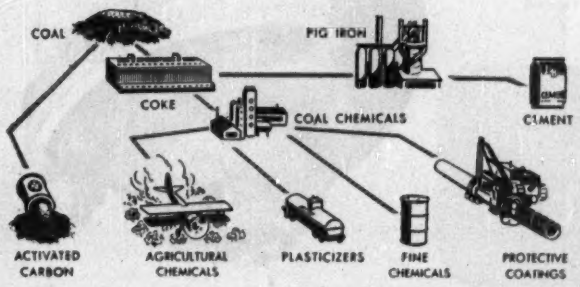
You can measure integration in YARDS

at PITTSBURGH COKE & CHEMICAL

YARDS . . . steps . . . or a stone's throw. Measure it as you will. The operation of Pittsburgh Coke & Chemical's Neville Island plant adds up to one of the most highly integrated manufacturing plants in the world today.

Within a few hundred yards . . . within a few dozen hours . . . this plant transforms small mountains of coal into insecticides, dyes, pig iron, cement and a score of other coal-derived or coal-related products that serve American industry and agriculture.

Is integration so highly developed as this *really* important? We think it is . . . and so do Pittsburgh Coke & Chemical customers. Because it enables us to keep an engineering finger on quality at *every* step of production, and to provide our customers with a reliable continuity of supplies that can stem only from an operation that's genuinely basic. *Aren't those the assurances you want, too?*



W&D 4728

P C&C C

PITTSBURGH
COKE & CHEMICAL CO.

OPERATOR REMOVES TRAY OF STEEL PARTS FROM ANNEALING FURNACE. G-E PYROMETER FURNISHES THE REQUIRED PRECISION CONTROL.

on small furnaces, ovens, kilns . . .

Use G-E Pyrometers for Precision Process Control

For single-unit process control jobs, such as the annealing operation shown above, cost takes on extra importance. General Electric's line of pyrometers offers relatively inexpensive control for common applications where reading accuracy within ¾ of 1% is permissible.

Low-cost control begins with G.E.'s low pyrometer prices. Prices start at $215.78*.

PRECISION CONTROL is your assurance that G-E pyrometers will read the same every time temperature conditions are the same. That's repeatability—the essence of precision control. A repeatable process means identical results, so important to modern industrial production.

HIGH SENSITIVITY—any change in temperature equivalent to 1/10 of 1% of full scale is enough to initiate control action. Tight sealing of all removable parts helps keep dirt or moisture from disturbing this sensitive control.

ACCURACY is sustained with automatic cold-junction compensation. This feature prevents any changes in ambient temperature (within 20 to 140°) from distorting the true reading.

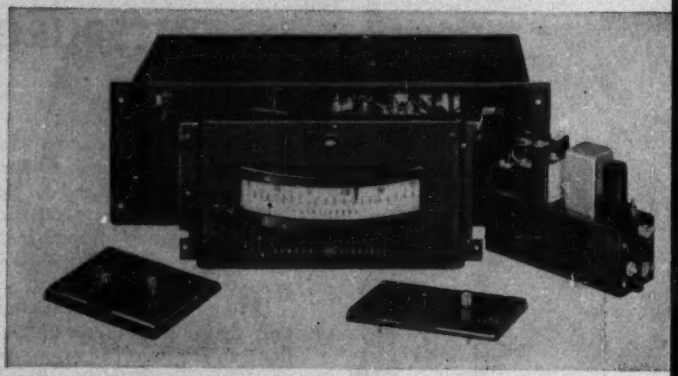
Accuracy is held to within ¾ of 1% of full scale.

SEVERAL TYPES AVAILABLE, including indicators, indicator controllers, and protectors. Offered in either 2-position or 3-position models for flush or surface mounting. Scale requirements can be fulfilled from a variety of temperature ranges in the 0-3000F span.

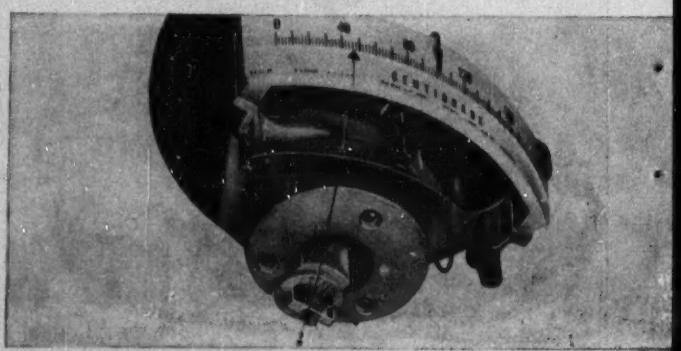
FOR COMPLETE INFORMATION, contact your G-E Apparatus Sales representative, or write for Bulletin GEC-713 to General Electric, Section 602-255, Schenectady 5, N. Y.

*Mfr's Suggested Retail Price.

GENERAL ELECTRIC

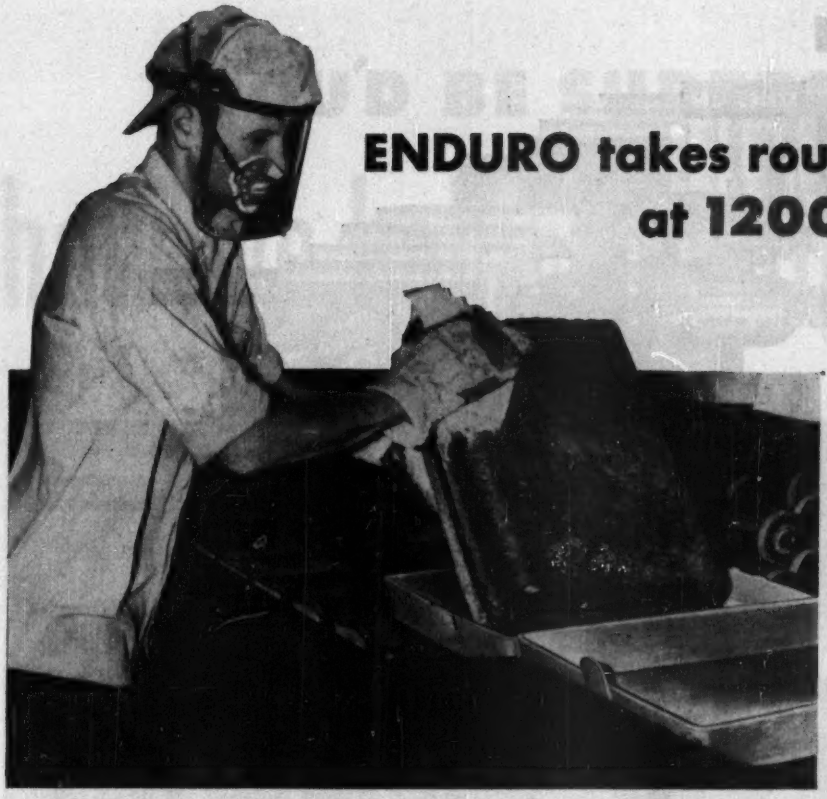


EASY MAINTENANCE is evident in such G-E construction features as the plug-in indicator and control units—replaceable in a moment.



SHOCK-RESISTANT CONSTRUCTION sustains accuracy with light moving-unit, 3¼-lb. alnico magnet, and sturdy stationary parts.

ENDURO takes rough handling at 1200° F



FOAMGLAS® *picture by courtesy of Pittsburgh Corning Corporation, Pittsburgh, Pa.*

● That's a stainless steel mold. It's filled with ground glass and carbon, then shoved into a furnace. It stays there 50 minutes, and the temperature peaks at 1700° F. While this is going on, there's an acidic condition at the surface of the metal.

It comes out of the furnace at 1200° F. The mold is stripped. And, here's where the real punishment comes in. Still at a high temperature, the stainless steel mold is hit by a blast of cold air or water. Then, it's coated with slurry.

These exposures to sudden drastic temperature changes—plus the acidic condition—eliminated many other materials for use as molds. Stainless steel does the job so well that these molds can be used 5,000 times before they have to be discarded.

Are you looking for a metal that can withstand high heat and corrosion? One that resists acids? One that can withstand high temperatures without appreciable scaling? ENDURO Stainless Steel may be the answer. Republic engineers will be glad to help you work it out. Write to:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

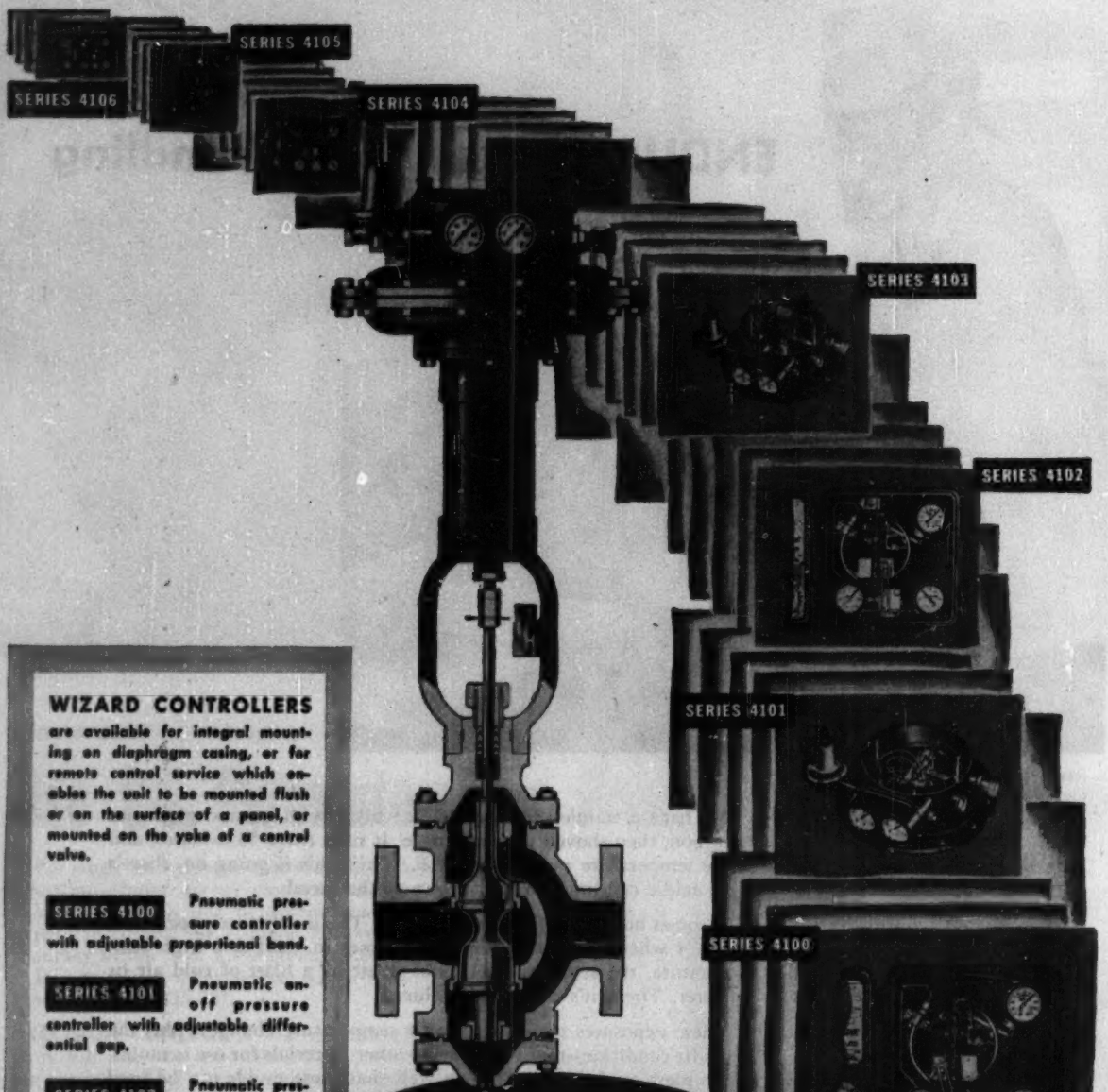
See and Hear "METALLURGY PLUS"

A 14-minute sight-seeing tour through Republic Steel mills making ENDURO Stainless Steel. Full color, 16 mm sound film. Available to qualified groups without charge. Requires 16 mm sound projector. Send name of organization and requested date to Republic Steel Corporation, 1470 Republic Bldg., Cleveland 1, Ohio, or your nearest Republic Steel Sales Office.

Republic

REPUBLIC STEEL

ENDURO STAINLESS STEEL



WIZARD CONTROLLERS are available for integral mounting on diaphragm casing, or for remote control service which enables the unit to be mounted flush or on the surface of a panel, or mounted on the yoke of a control valve.

SERIES 4100 Pneumatic pressure controller with adjustable proportional band.

SERIES 4101 Pneumatic on-off pressure controller with adjustable differential gap.

SERIES 4102 Pneumatic pressure controller with non-bleed orifice and low pressure cut-off.

SERIES 4103 Low pressure Wizard, bellows actuated with differential gap.

SERIES 4104 Wizard controller with differential gap and non-bleed pilot.

SERIES 4105 Bellows actuated differential pressure controller.

SERIES 4106 Low pressure, bellows actuated, Wizard pressure controller.

FISHER

FISHER®

WIZARD PRESSURE CONTROLLERS

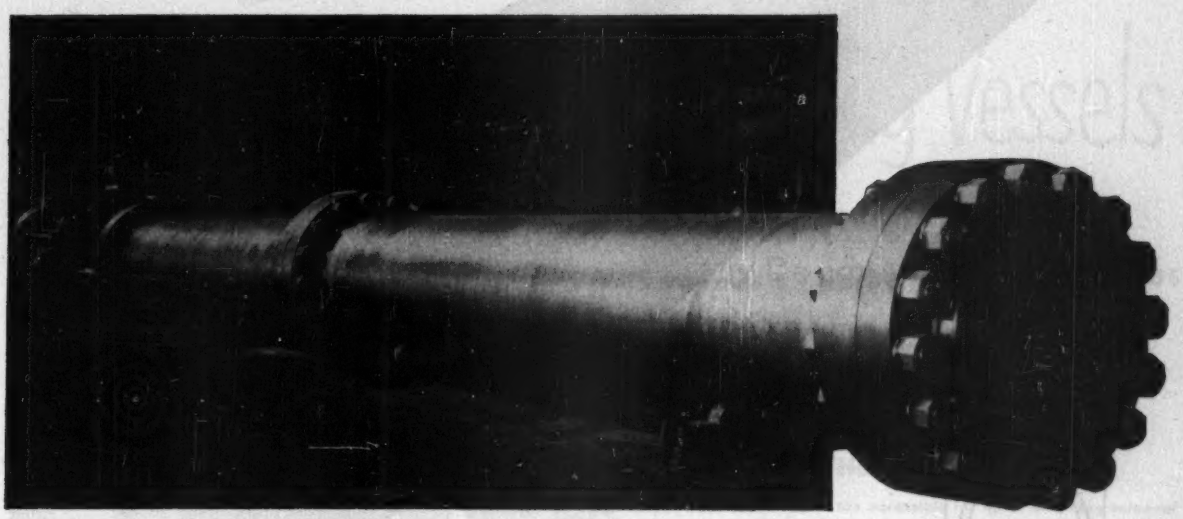
Available in a variety of constructions for your particular requirements in the CHEMICAL PROCESS INDUSTRIES, GAS DISTRIBUTION, PIPE LINE TRANSMISSION, POWER PLANTS, REFINERIES, OIL PRODUCTION and GENERAL INDUSTRIAL APPLICATIONS.

FISHER GOVERNOR COMPANY • Marshalltown, Iowa

WORLD LEADER IN THE MANUFACTURE OF LIQUID LEVEL CONTROLLERS, PRESSURE REGULATORS AND IN RESEARCH FOR BETTER CONTROL

YOU'D BE SURPRISED

how we baby the big brutes



Though the pressure vessels we build are massive, heavy, and altogether rugged, we treat 'em like babies at every step of manufacture.

First of all, the steel must be made exactly right. Then the forging has to be done by experts, men who can handle the big presses deftly and with just the proper touch. When the heat-treaters take over, timing, temperatures, and other details are constantly watched. And in the machine shops, craftsmen patiently shape the vessel into its final form, checking each step to make certain of meeting their own high standards and customer specifications.

Does all this care pay off? It does! For the vessel will then test out at specified pressures—thousands of pounds per square inch. It is ready for work and will stay on the job for years.

Bethlehem is equipped to produce forged vessels of almost every size and type . . . reactors, filters, converters, separators, high-pressure accumulators, large autoclaves, etc. These can be of single- or multiple-section design, whichever you require. Call or write us at any time for full details.

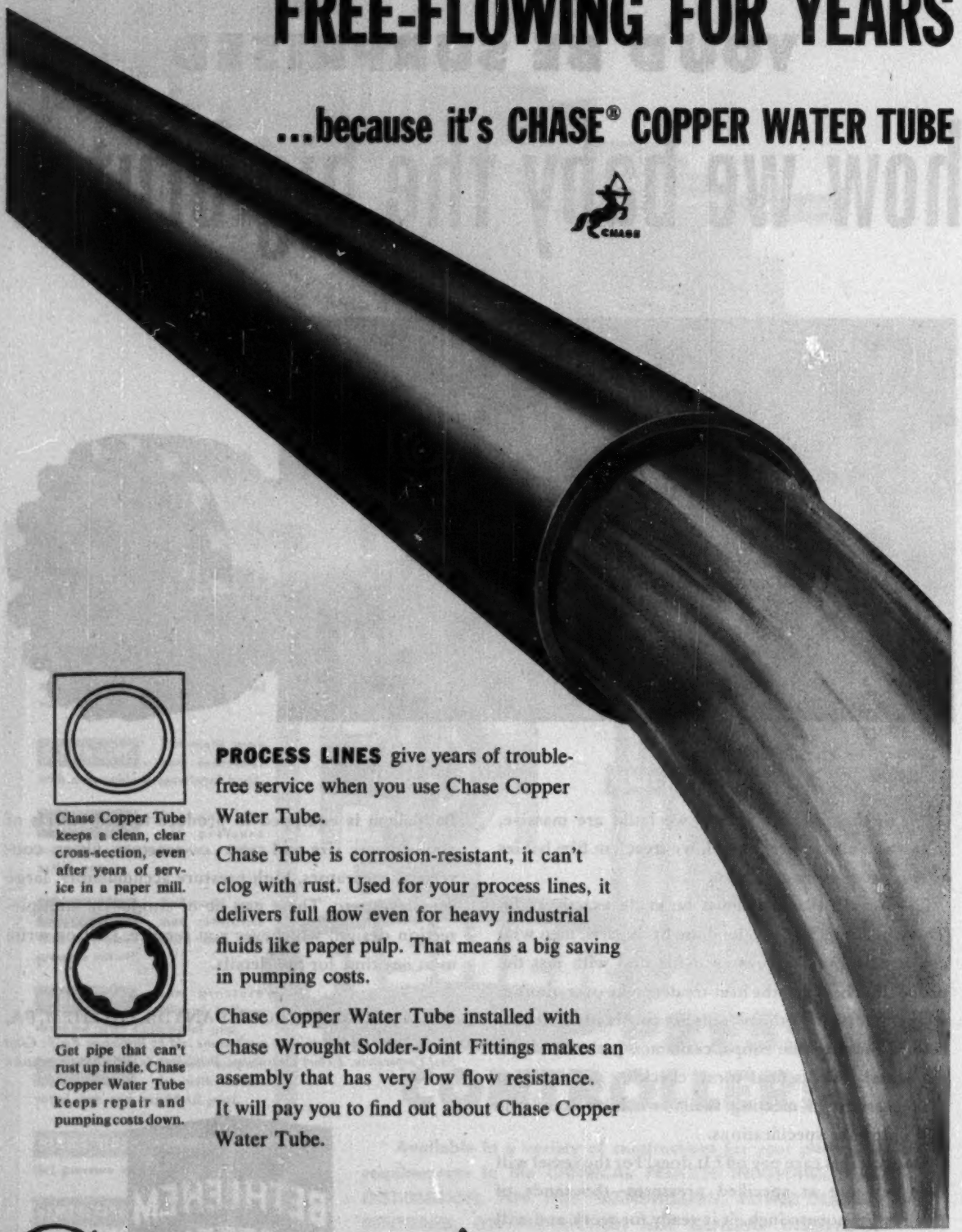
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

FREE-FLOWING FOR YEARS

...because it's CHASE® COPPER WATER TUBE



Chase Copper Tube keeps a clean, clear cross-section, even after years of service in a paper mill.

Get pipe that can't rust up inside. Chase Copper Water Tube keeps repair and pumping costs down.

PROCESS LINES give years of trouble-free service when you use Chase Copper Water Tube.

Chase Tube is corrosion-resistant, it can't clog with rust. Used for your process lines, it delivers full flow even for heavy industrial fluids like paper pulp. That means a big saving in pumping costs.

Chase Copper Water Tube installed with Chase Wrought Solder-Joint Fittings makes an assembly that has very low flow resistance. It will pay you to find out about Chase Copper Water Tube.

Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

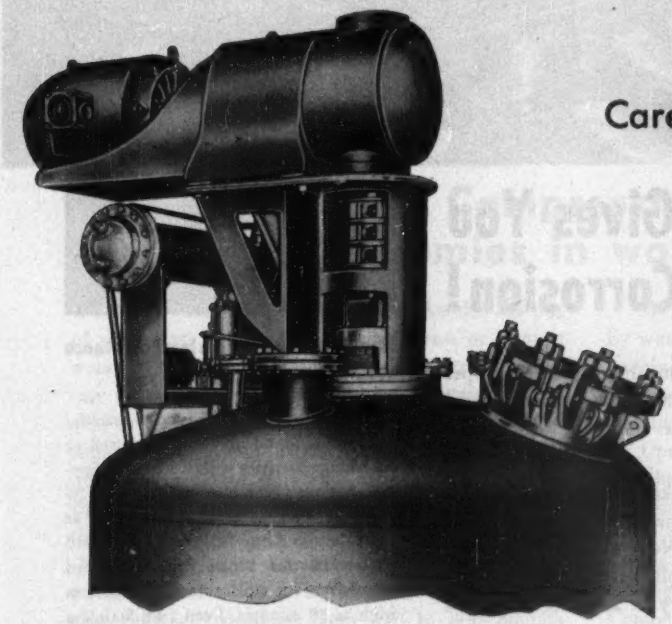
Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	
Chicago	Houston	Newark	Rochester†	(†sales office only)
Cincinnati	Indianapolis	New Orleans	St. Louis	

For Smooth Driving Action!

Easy Accessibility of Parts!

Long Trouble-Free Service!

Struthers Wells Processing Vessels

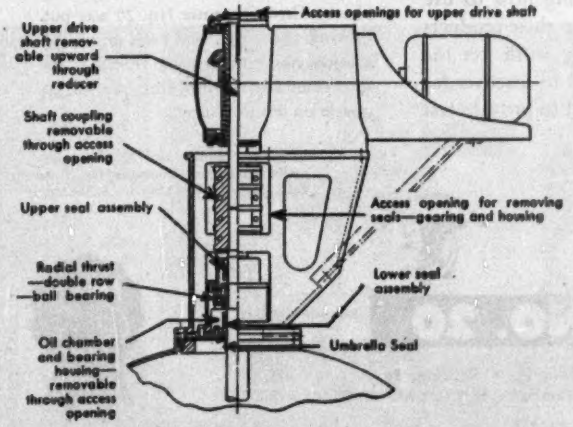


are equipped with Carefully Designed Agitator Drives for Extreme Temperature and Pressure Service

NOTE THESE FEATURES . . .

- ★ All parts are accessible for quick and easy removal and replacement.
- ★ Agitator Drive Shaft is radially supported at top and bottom of the drive providing a spread of bearings practically equal to the vertical space occupied by the drive.
- ★ Agitator Drive Shaft thrust is taken by radial-thrust double row ball bearing located in close proximity to pressure seals insuring accurate centering and a minimum end-wise motion of the shaft at locations of seals.
- ★ Seal parts are carbon and non-corrosive metals to withstand corrosion in the same degree as the metal used in the vessel.
- ★ Oil circulating unit provides equalized liquid pressure seal, which also lubricates and cools the working parts.
- ★ An umbrella seal is provided to accumulate seepage of oil across the seal face and eliminate contamination of vessel content.
- ★ Standard units are available for full vacuum or pressures up to 500 psi. with processing temperatures up to 650° F.
- ★ Made in five sizes—ranging from 1 to 50 horsepower.

Cross Sectional View Shows Accessibility of Parts


Access openings for upper drive shaft
Upper drive shaft removable upward through reducer
Shaft coupling removable through access opening
Upper seal assembly
Access opening for removing seals—gearing and housing
Radial thrust —double row —ball bearing
Lower seal assembly
Oil chamber and bearing housing—removable through access opening
Umbrella Seal

There is a dependable Struthers Wells Agitator Drive that will meet your exacting requirements. Write today for complete data on the size drive that will best suit your needs.

Struthers Wells

STRUTHERS WELLS CORPORATION

Process Equipment Department . . . Warren, Pa.

PLANTS AT WARREN, PA. • TITUSVILLE, PA. OFFICES IN PRINCIPAL CITIES

This Super Stainless Gives You New Freedom From Corrosion!

When you're faced with a severe corrosion problem, investigate the super corrosion resistance of Carpenter Stainless No. 20. This sulphuric acid resisting Stainless can often reduce shutdown time and add substantially to equipment life.

If you are familiar with this alloy in its cast form, known as Durimet 20*, you can appreciate Carpenter No. 20's superior resistance to sulphuric acids, plating and pickling solutions, mixed acids, etc. Now that Carpenter has solved the problem of producing this Stainless in rolled forms such as bars, wire, strip and tubing, the alloy is enabling industry to add months—even years to equipment life.

Of course, because of No. 20's high nickel content, there isn't always enough to "go around". Yet many engineers tell us they're planning now to use No. 20 as soon as possible to improve corrosion resistance in their products and reduce shutdowns. For help in your product planning work get the new Carpenter Stainless No. 20 Book. In addition, start now to discover for yourself the far-reaching advantages of No. 20. We'll be glad to provide test coupons and work with your engineering staff.

Imagine What Corrosion Resistance Like This Can Mean To You!

The problem here was to find a material that would stand up in nozzles used to fill storage batteries with electrolyte. Special fixtures were used to handle 12% sulphuric acid (specific gravity 1.080) at temperatures from 70°F to 130°F. Hard rubber nozzles broke frequently—and shutdowns for replacement often ran as high as 30 minutes. Even 18-8 Stainless nozzles, while solving the breakage problem, corroded so badly they lasted only *2 weeks* (see 18-8 nozzle on right of photo). Then Carpenter No. 20 was put to work. After they had been in use for *many months*, nozzles made from No. 20 showed no signs of corrosion (see No. 20 nozzle on left of photo).

*Carpenter Stainless No. 20 is licensed under The Duriron Company, Inc., U.S. Pats. 2,134,670; 2,185,987 and 2,200,208.

Carpenter

STAINLESS NO. 20

Another Carpenter First!

The Carpenter Steel Company • 127 W. Bern St. • Reading, Pa.
Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Pioneers in Improved Tool, Alloy and Stainless Steels Through Continuing Research

fresh water...from the sea!

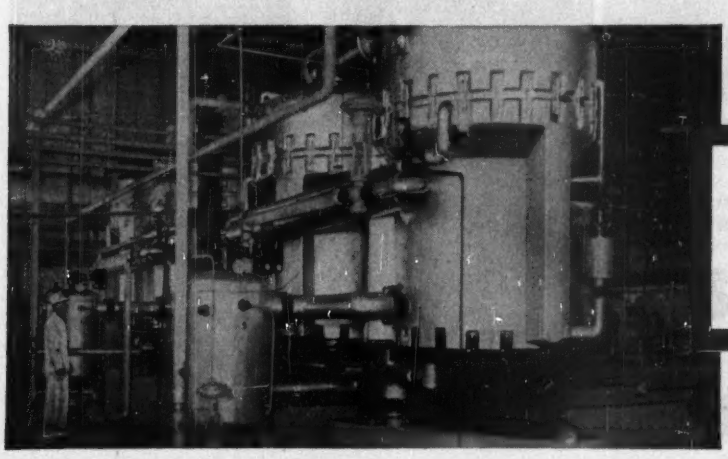
Cleaver-Brooks Compression Stills Offer You new economies in water distillation

Cleaver-Brooks Compression Stills take the *sea* out of sea-water. In fact, any source of raw or impure water — brackish, contaminated pools, streams, etc., can be transformed into crystal-clear, tasty, palatable drinking water. The quality far exceeds USPH standards. Many industrial large-volume users requiring pyrogen-free water widely use Cleaver-Brooks stills for chemical processing and pharmaceutical preparations.

Operating costs are extremely low. For every pound of fuel oil used, a Cleaver-Brooks Compression Still will produce from 175 to 300 pounds of pure water. This greatly exceeds the production attainable from multiple-effect steam stills.

By installing a Cleaver-Brooks unit at any nearby water source, you eliminate pipe lines, trucking, barging or other water hauling from a remote source. Then too, you eliminate possibility of long-distance delivery failures.

Operation is simple and automatic — based on the "heat-pump" principle. Standard units are available in capacities of 85 to 2800 gph (320 to 10,585 liters per hour), diesel engine or electric motor driven — stationary or portable models. Write for catalog and complete information. Cleaver-Brooks Company, Dept. H, 365 N. Grand Ave., Waukesha, Wis., U.S.A. Cables: CLEBRO—Milwaukee all codes.



This plant is one of the largest compression still installations in the world, producing over 100,000 gallons of pure water daily.

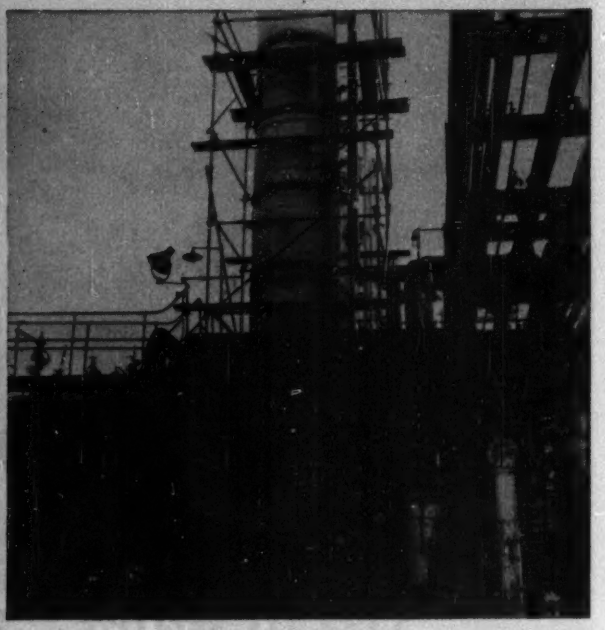
Cleaver-Brooks

PIONEERS IN THE DEVELOPMENT OF COMPRESSION DISTILLATION

Other Cleaver-Brooks products include: Steam Boilers • Bitumen Heaters • Oil and Gas-Fired Conversion Burners

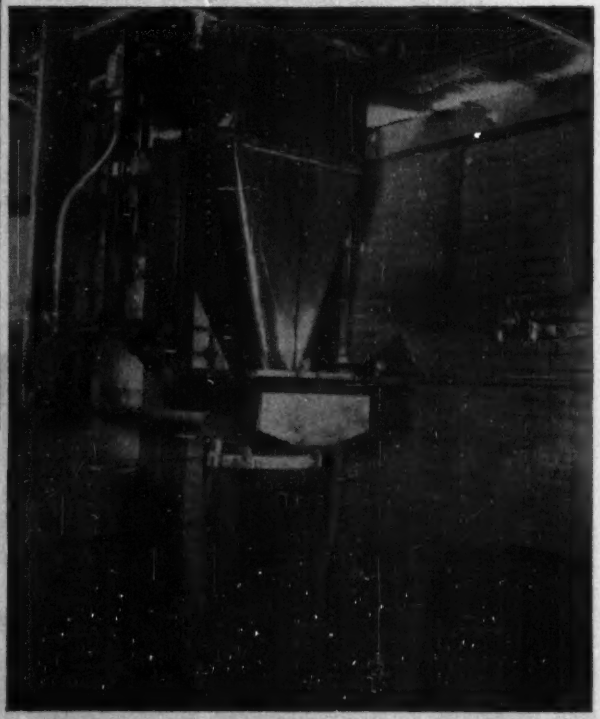
THESE TEN-YEAR-OLD PUMPS for circulating organic acids are built entirely of Stainless Steel. In spite of their long service, they are still in very good condition.

STAINLESS STEEL also resists corrosion in the column and kettle of this batch still kettle for distillation of esters. The equipment, still in good condition, has been in use three years.



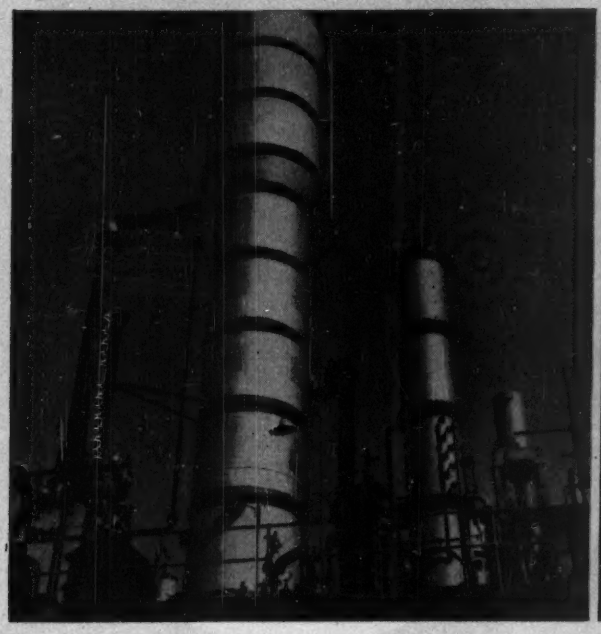
For corrosion resistance

STAINLESS STEEL STRIPPING MILL is used for removing water from organic liquids. It is four years old and still ready for more service.

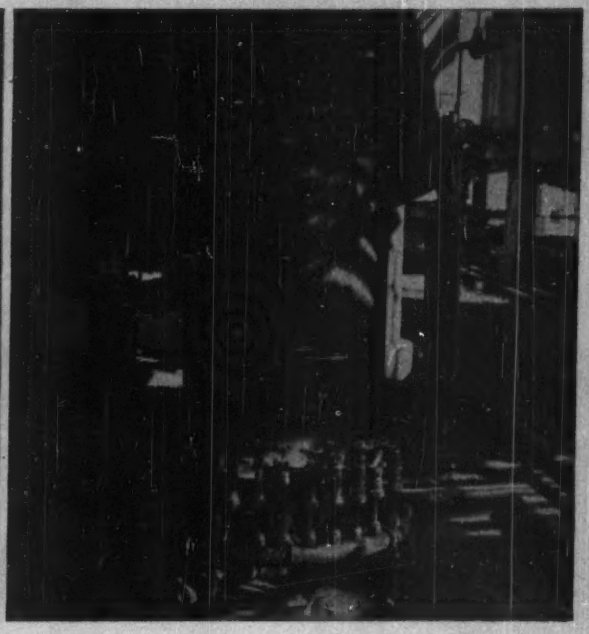


ALL PARTS of this automatic bagging machine in contact with hot resin are Stainless Steel. Stainless is used to prevent contamination of vinyl resin.

VESSEL AND ALL INTERNALS of this still for distillation of acetic acid are Stainless Steel for resistance to corrosion. The Stainless is in good condition after three to four years' service.



OLIVER LEAF FILTER, used to remove salt from an organic base, has shell, leaves and valves of Stainless Steel. In service between four and five years, it is in excellent condition.



in petro-chemical operations

THIS MAJOR TEXAS PRODUCER SELECTS

STAINLESS STEEL

● At its big Gulf Coast operation, this producer of petro-chemicals makes extensive use of Stainless Steel in many types of processing equipment.

In some of these applications, Stainless Steel's resistance to corrosion led to its selection. In others, the absence of product contamination that Stainless assures was the determining factor.

These are only two of the important benefits of Stainless Steel in chemical processing equipment. Others include ease of cleaning, elimination of downtime for replacement, excellent performance in certain high temperature operations or when high pressures are involved.

It will pay you to investigate the use of Stainless Steel in your plant wherever you need these benefits. And if you want the finest performance, be sure you use perfected, service-tested U·S·S Stainless Steel.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

USS

3-1087

UNITED STATES STEEL

Chemico

"a world of achievement in a word"

It has been said that achievement is the measure of progress. Let's look at Chemico's record.

Since 1914 Chemico has been responsible for more than 900 installations in practically every far-flung corner of the earth, to say nothing of its wide scale projects at home. Ammonia and nitrogenous fertilizer for India, Mexico, Egypt and the Philippines; sulfuric acid for Canada, England, Formosa, Brazil and South Africa; urea for Japan; waste acid recovery for Iran, to name a few.

Thirty-nine years of satisfactory service to its clients has earned Chemico a proud record of achievement.

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

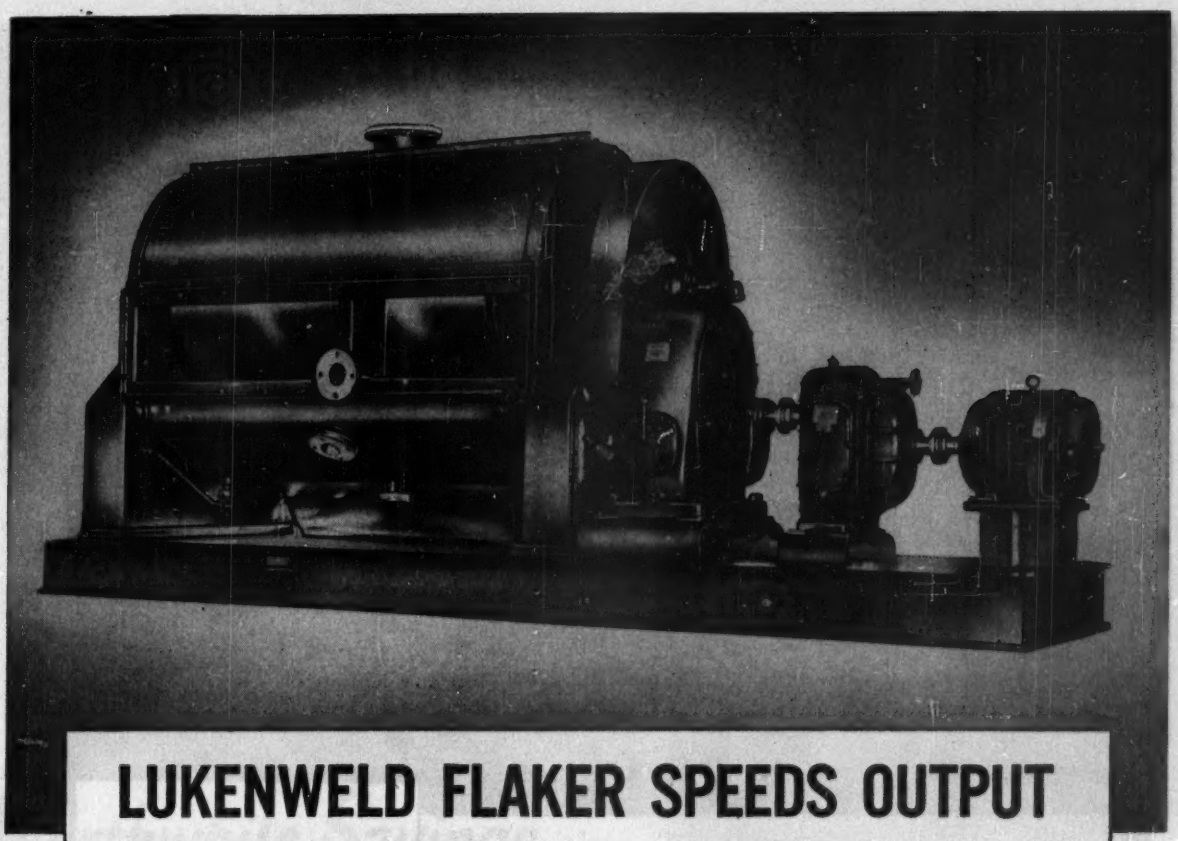
488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVES: CYANAMID PRODUCTS LTD., LONDON • CHEMICAL CONSTRUCTION (INTER-AMERICAN) LTD., TORONTO • SOUTH AFRICAN CYANAMID (PTY) LTD., JOHANNESBURG

Chemico plants are profitable investments

CC249



LUKENWELD FLAKER SPEEDS OUTPUT FOR TENNESSEE PRODUCTS

In producing a new insecticide, the Tennessee Products & Chemical Corporation required high output . . . close temperature control . . . protection of product quality. A special Lukenweld flaking machine, employing the revolutionary features of Lukenweld jacketed steel rolls, met all three requirements at low cost and with savings in weight and power.

The high output and delicate temperature control made possible by the double-shell design of the Lukenweld roll results in rapid crystallization, fast flaking and high product quality. Quality is also protected by non-corrosive surfaces that contact the product before it is crystallized and scraped off by a doctor blade—the roll is chrome plated, the steam jacketed dip pan is nickel-clad steel, the agitators are solid nickel. And, because Lukenweld furnished the complete unit, it was installed as a single package, backed by a single source of responsibility.

If faster heating, cooling or flaking is your problem, Lukenweld jacketed rolls may be the answer. Built of rolled steel plate, they can be designed to operate safely at more than 350 psi. Use of plate permits a shell 40 to 75% *thinner* than ordinary rolls for faster heat flow, rapid heat up, quick shut down. With no heads to crack, no gaskets to blow out, you'll find Lukenweld design assures dependable long life, while better temperature control assures uniform product quality.

LUKENWELD

DIVISION OF LUKENS STEEL COMPANY

LUKENS

—SEND COUPON FOR FREE BOOKLET—

Lukenweld Division of Lukens Steel Company
400 Lukens Building, Coatesville, Pa.

Gentlemen:

Please send me your color booklet, "10-67 Percent More Production," containing information on Lukenweld Jacketed Drier Rolls.

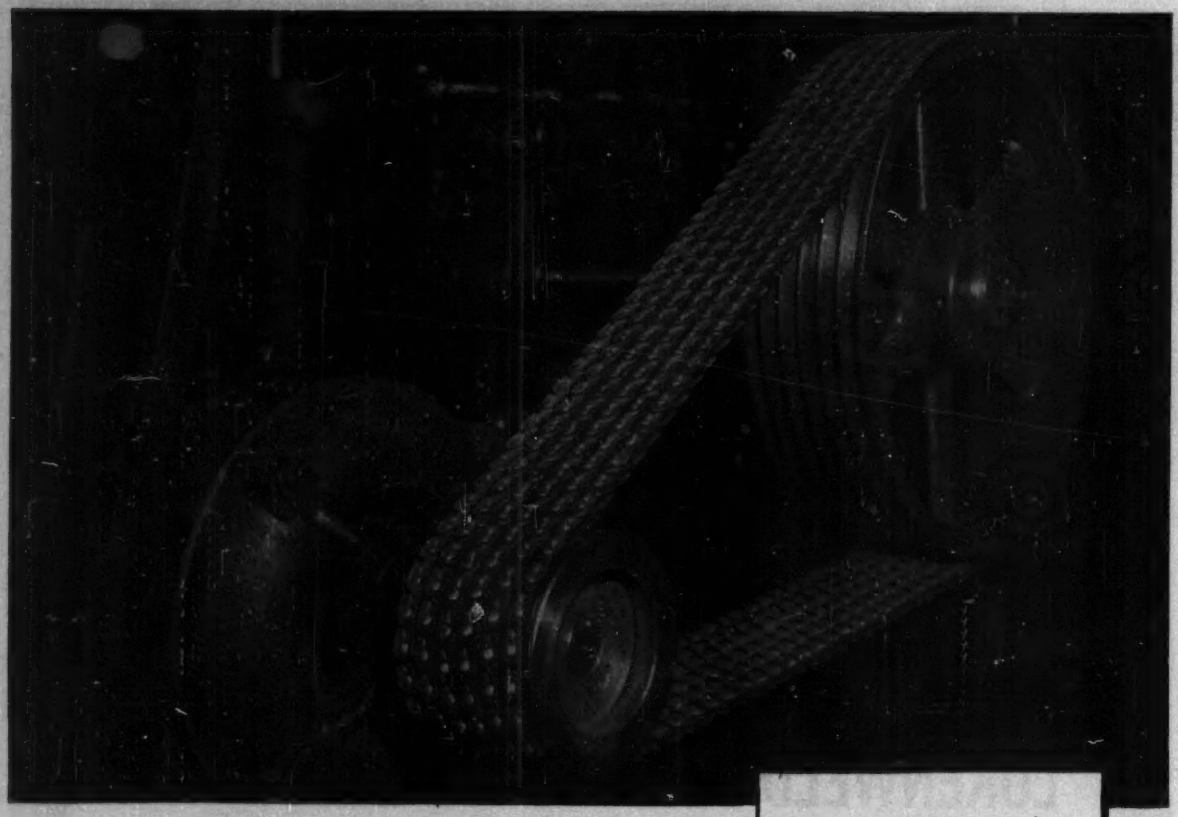
NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....



with Veelos on your machines...

v-belt adjustment is a production-saving job

All v-belts stretch—but with endless v-belts there's nothing you can do to take up this stretch once the motor has been completely "run-out". With Veelos it's another story! The adjustment is in the belt itself—even sliding motor bases are unnecessary.

Changing the length of each Veelos v-belt by just adding or removing links is the best, most efficient, way to keep the belts correctly matched. Using Veelos means that the job of adjustment is done easily and quickly . . . at a fraction of the cost of replacing with new belts.

Veelos, the adjustable v-belt, provides vibrationless, full power delivery. It is easier to stock and control because it is packaged on 100-foot reels in every standard width. And Veelos can be adjusted or made up in correctly matched sets with the least amount of machine down-time—at production-saving speed!

Have you seen this Veelos Facts Book?

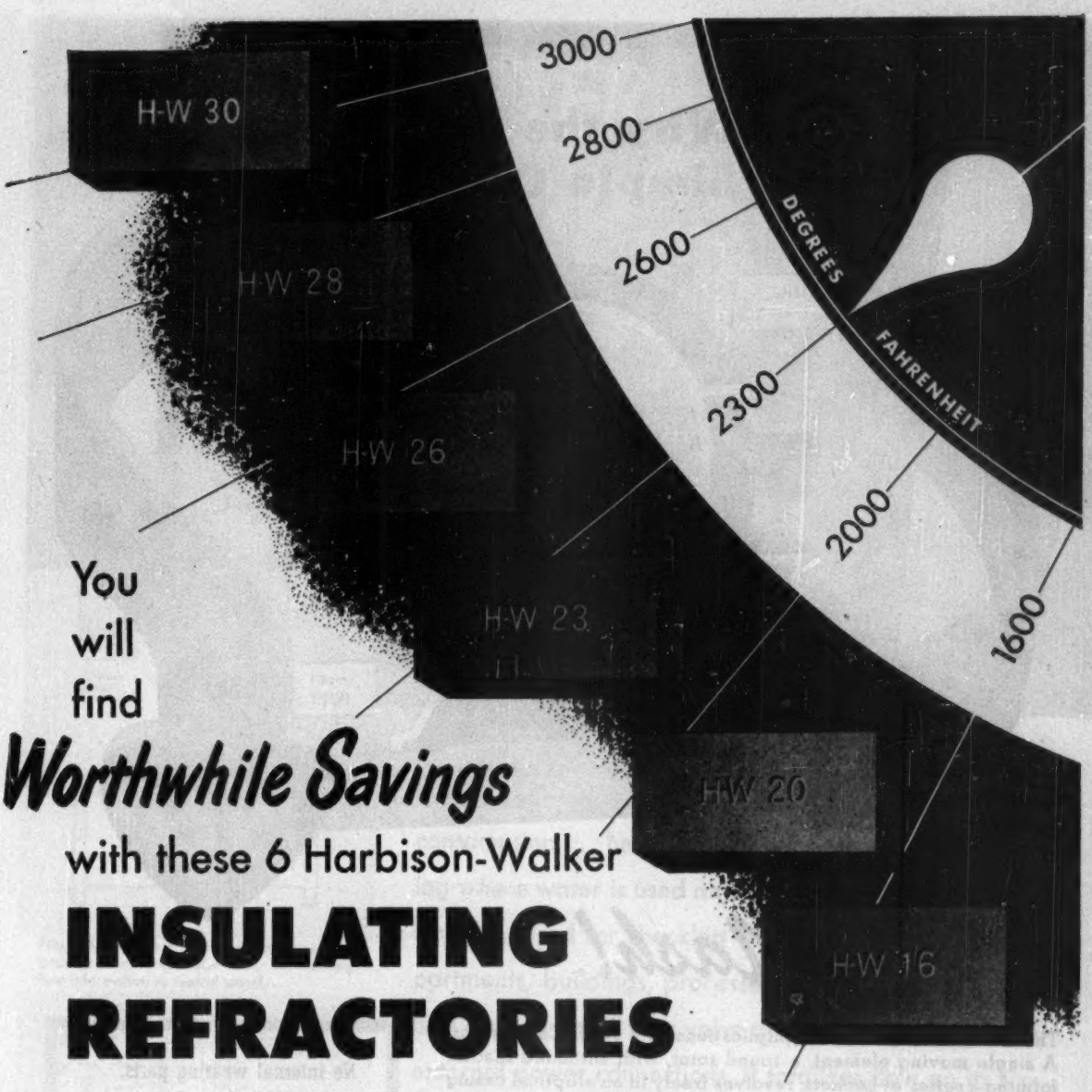
Your Veelos v-belt distributor's salesman will be glad to give you a quick trip through this fact-packed, 36 page book. You'll find it well worth the few minutes it takes. Next time the salesman calls, ask him to show it to you.

VEELOS
THE LINK
V-BELT

Write today for your copy of the Veelos Data Book—it is a completely illustrated, 28-page catalog that gives file-worthy product and engineering facts which you should have handy. We'll be glad to send you a copy at once.

MANHFIM MANUFACTURING AND BELTING COMPANY
602 Manbel Street, Manheim, Penna.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE



You will find

Worthwhile Savings

with these 6 Harbison-Walker

INSULATING REFRACTORIES

The balanced properties of Harbison-Walker Insulating Brick mean superior performance and dependable service. Light weight, essential to high insulating value and low heat storage, has been attained to the greatest degree consistent with the good mechanical strength necessary for handling and for many furnace structures.

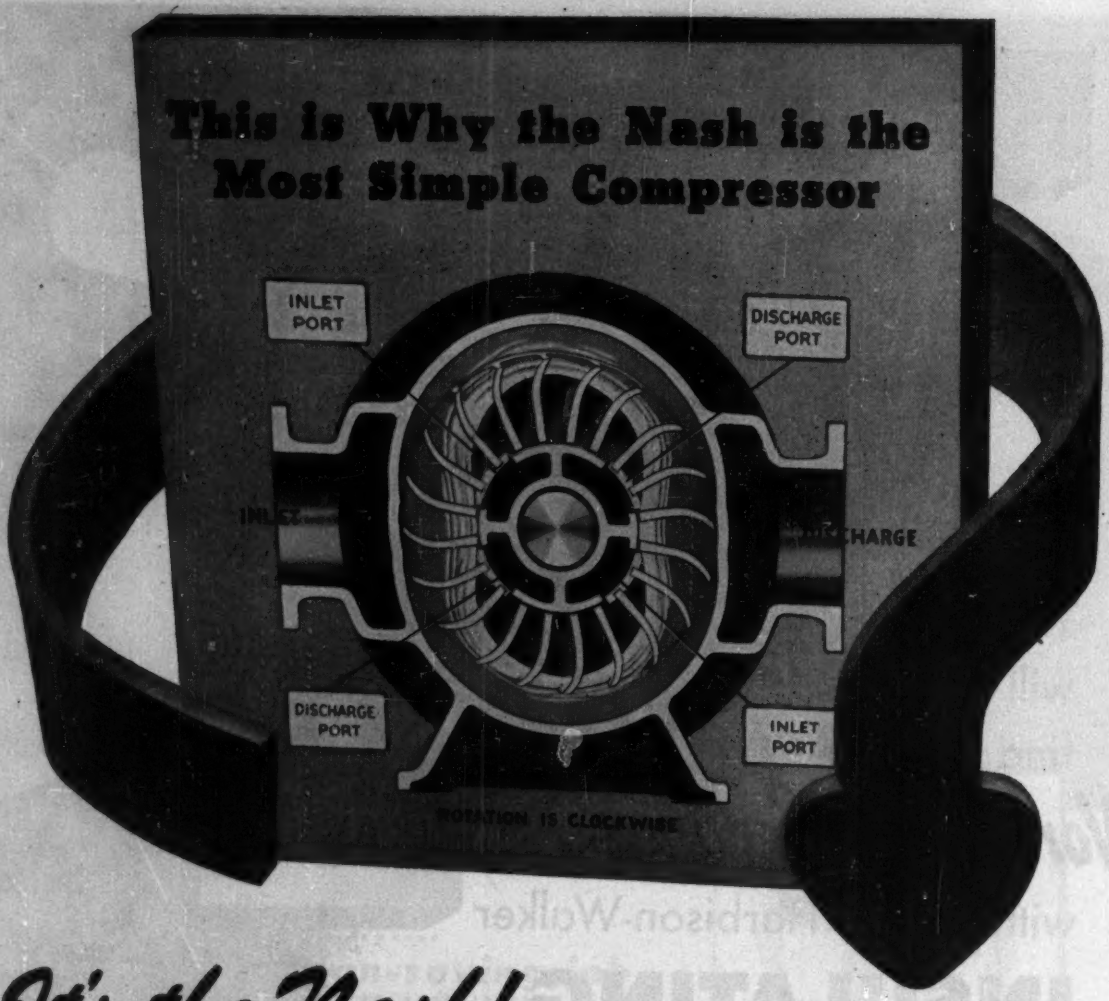
Available in six classes, suitable for service in the temperature ranges indicated above, Harbison-Walker Insulating Brick reduce heat losses, save space, absorb noise, conserve fuel.

H-W 85 and H-W 56 CASTABLES are widely used to great advantage in monolithic structures for refractory insulation.

We will gladly send you bulletins containing data and descriptive information about Harbison-Walker Insulating Brick and Insulating Castables.

Harbison-Walker Engineering Service will help you with the selection of the insulating refractories best suited for your requirements.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Largest Producer of Refractories
GENERAL OFFICES PITTSBURGH 22, PENNSYLVANIA



It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

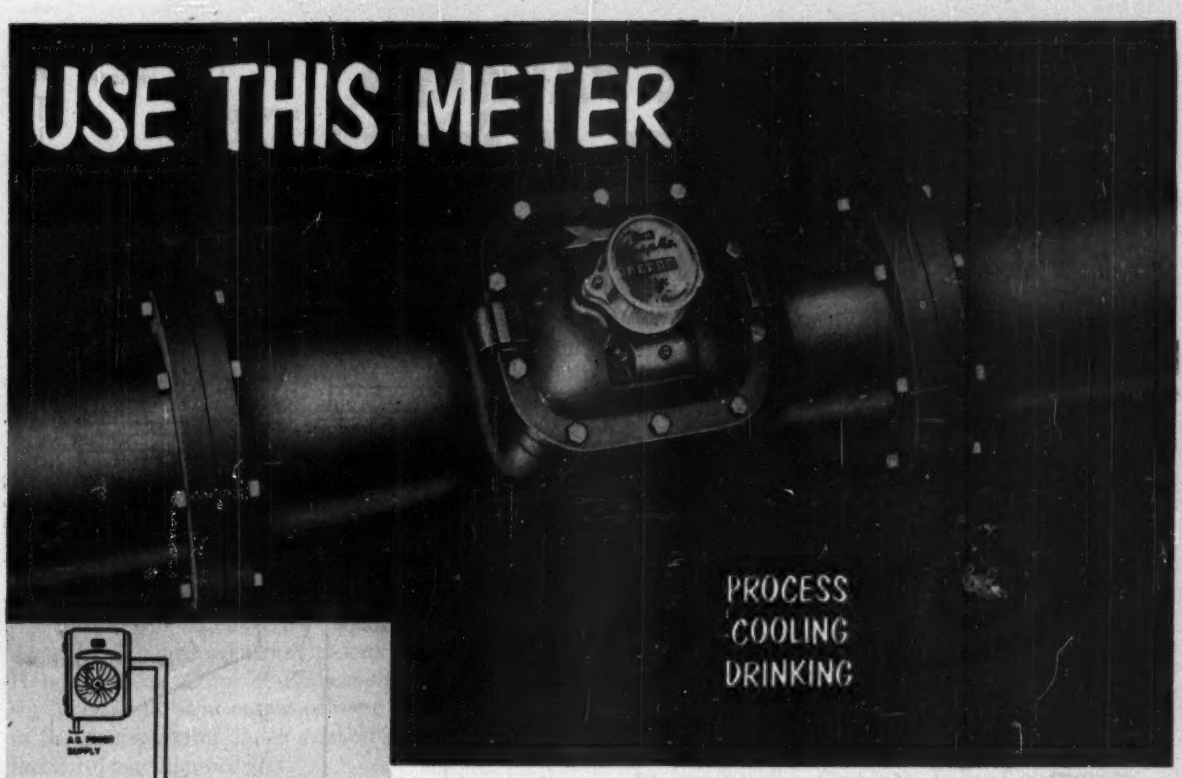
Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

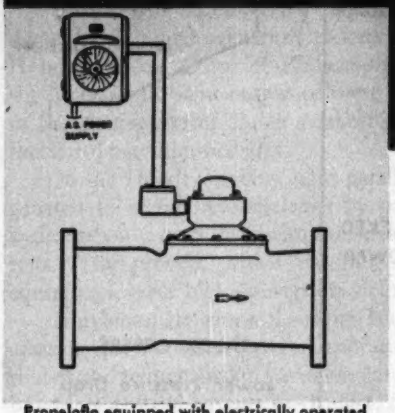
Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

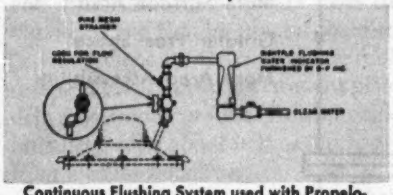
NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

USE THIS METER

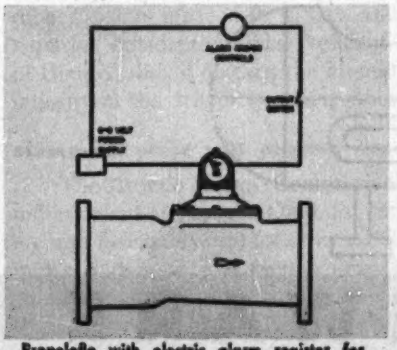




Propeloflo equipped with electrically operated totalizer-indicator-recorder for transmitting flow information to central panel.



Continuous Flushing System used with Propeloflo Meter when metering corrosive or sediment-bearing liquids.



Propeloflo with electric alarm register for measuring predetermined quantities of liquids in "batch" processes.

Builders Propeloflo Meter—the modern propeller-type meter — gives the gallon-by-gallon story on water consumption . . . helps keep water costs down by showing *where* water is used and *how much*. The Propeloflo is widely used for checking water consumption by departments, buildings, processes, areas, etc. This meter is as easy to install as a valve or fitting and requires no external power connections. It totalizes flow on its six-digit counter directly in gallons or other volumetric units. Furnished for pipelines 2" to 36" and larger.

BUILDERS

(DIVISION OF B-I-P INDUSTRIES)

SEND COUPON FOR DETAILS

BUILDERS-PROVIDENCE, INC.
369 Harris Ave., Providence 1, R. I.

Please send Bulletin 380-K4 describing Builders Propeloflo Meter.

Name.....

Company.....

Street.....

City..... State.....

INTALOX SADDLE PACKING DISTILLS 10% MORE CHARGE IN 10% LESS TIME

Field experience is consistently bearing out earlier test data reflecting the greater efficiency of Intalox Saddle Packing. But it is infrequent to have such excellent comparative data as that furnished us by a major manufacturer of organic chemicals.

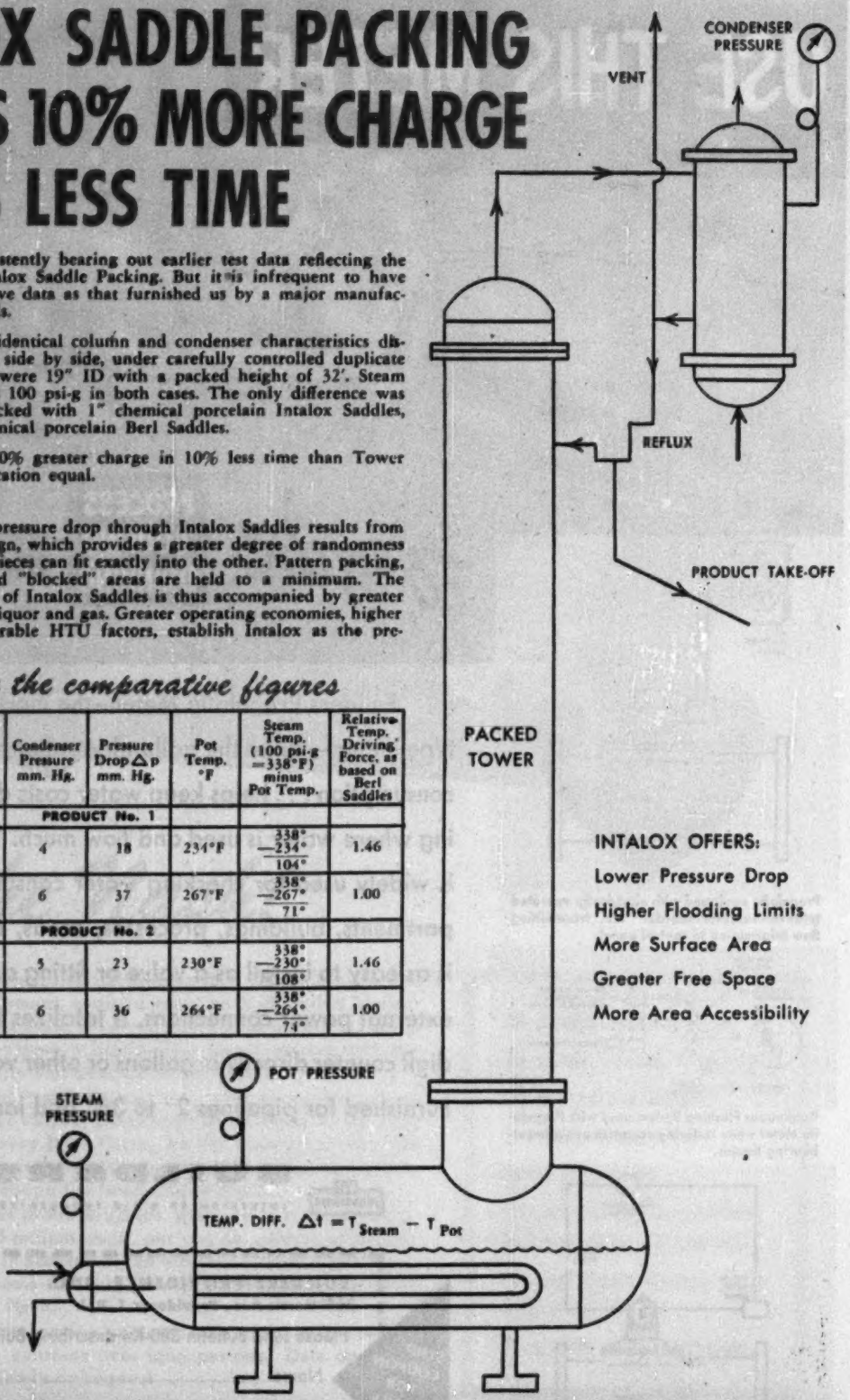
Two column stills with identical column and condenser characteristics distilled the same materials side by side, under carefully controlled duplicate conditions. The Towers were 19" ID with a packed height of 32'. Steam pressure in the coils was 100 psi-g in both cases. The only difference was that Tower "A" was packed with 1" chemical porcelain Intalox Saddles, Tower "B" with 1" chemical porcelain Berl Saddles.

Tower "A" handled a 10% greater charge in 10% less time than Tower "B" with product specification equal.

The substantially lower pressure drop through Intalox Saddles results from the unique, patented design, which provides a greater degree of randomness in packed beds. No two pieces can fit exactly into the other. Pattern packing, nesting, over-lapping and "blocked" areas are held to a minimum. The greater total surface area of Intalox Saddles is thus accompanied by greater available surface area to liquor and gas. Greater operating economies, higher product yields, and favorable HTU factors, establish Intalox as the preferred packing.

Here are the comparative figures

Tower	Type of Packing	Pot Pressure mm. Hg.	Condenser Pressure mm. Hg.	Pressure Drop △p mm. Hg.	Pot Temp. °F	Steam Temp. (100 psi-g = 338°F) minus Pot Temp.	Relative Temp. Driving Force, as based on Berl Saddles
			PRODUCT No. 1				
A	1" Intalox Saddles	22	4	18	234°F	338° − 234° = 104°	1.46
B	1" Berl Saddles	43	6	37	267°F	338° − 267° = 71°	1.00
			PRODUCT No. 2				
A	1" Intalox Saddles	28	5	23	230°F	338° − 230° = 108°	1.46
B	1" Berl Saddles	42	6	36	264°F	338° − 264° = 74°	1.00



INTALOX OFFERS:
Lower Pressure Drop
Higher Flooding Limits
More Surface Area
Greater Free Space
More Area Accessibility

164-d

U. S. STONEWARE
AKRON 9, OHIO

THE Chementator®

Prepared under the direction of Joseph A. O'Connor, News Editor

• Look for new non-electrolytic methods for making hydrogen peroxide that sidestep power requirements. Buffalo Electro-Chemical is at work on such auto-oxidation processes, and Du Pont most likely will use one in its Memphis, Tenn., plant.

• Carbon black can be made from waste gas in low-cost packaged plants by a new process of Lynn Carbon Black Co. of San Angelo, Tex. Controlled preheating and combustion, plus rapid product removal, give exceptionally high yields.

Way to ease the butylene and butadiene famine

Butane can be converted to butylenes and butadiene by a dehydrogenation process now offered by Houdry Process Corp. of Philadelphia. It's expected the process will boost output of these chemicals for use in the production of scarce aviation gasoline and synthetic rubber intermediates.

In the Houdry process, light paraffins are dehydrogenated to olefins and diolefins by passing preheated hydrocarbon vapors over chromic oxide-alumina catalysts. The process, which requires no special alloy equipment, gives high conversion yields.

Butylenes are currently short because of the increasing competition between producers of synthetic rubber and refiners making aviation gasoline. Both need butylenes as basic feedstocks. In fact, the shortage is so acute that butylenes for both uses are allocated at present. Production of butylenes from the large stocks of butane by the Houdry process could ease this situation.

Butadiene for GR-S synthetic rubber was produced during the war in two government plants by the Houdry dehydrogenation process. Rubber made from petroleum butadiene costs about half as much as rubber produced from alcohol butadiene.

Now that the government has taken controls off rubber production, increasing demand for synthetic rubber, paints made with rubber, and synthetic fibers requiring butadiene, thinks President C. G. Kirkbride of Houdry, should quicken the interest of the chemical industry in the dehydrogenation process.

Mammoth plant will process uranium ore

The Atomic Energy Commission's whopping $78 million plant at Fernald, Ohio, for converting uranium ore into fissionable feed for other AEC plants is getting into operation as construction nears completion. National Lead will run the plant for the government.

Scope of the undertaking is eye-bugging. Catalytic Construction Co. will spend about $30.4 million for the engineering job and to procure process equipment. Much of the equipment had to be specially designed. Catalytic Construction got it from over 1,200 concerns. A precision mill had to be designed to roll uranium ingots into bars in production quantities. Special furnaces, tanks, vessels and conveyors were required. In addition, power centers, boilers, electric motors and control centers had to be procured.

For construction, George A. Fuller Co. estimates costs will total about $47 million. Three hundred subcontractors participated in the construction work. Up to March of this year, Fuller and its principal subcontractors had spent $23,747,000 on payrolls and $18,610,000 on materials, supplies and equipment. Eighty-eight percent of the $18,610,000 was spent with small business, and about 85 percent of the total construction cost was spent in the Cincinnati area. At peak in March 1952, 3,200 construction workers swarmed over the site. Currently, 1,237 are still employed in finishing the job.

Originally a $30 million undertaking, the Fernald project mushroomed like an atomic cloud as additional expansion was included in the planning. Acquisition of the 1,050-acre site alone cost $600,000.

George W. Wunder, plant manager for National Lead, places current operating employment at 1,187. Since July 1951 through this spring, National Lead's payroll has totaled almost $4 million. The company has spent about $3 million for materials and supplies and $450,000 for equipment. About 80 percent of its purchases have been made from small business and 84 percent of the operating dollar has gone to the Cincinnati area.

Briefly, the Feed Materials Production Center is a completely integrated series of plants whose function is to convert raw uranium ore into highly pure uranium metal in various shapes. The process is designed to reclaim essentially all of the uranium contained in the ores, and also much of the chemicals used in the processing steps. Among intermediate products in the process are: orange oxide (UO_3), green salt (UF_4), and metal ingots, rods and slugs.

Manufacture of uranium feed compounds and metal, as at Fernald, is an integral part of the chain of processes culminating in production of fissionable materials. The fissionable materials and other isotopes produced in the atomic reactors at Savannah River and Hanford, Wash., or in the gaseous diffusion separation plants at Oak Ridge, Tenn., and Paducah, Ky., from the products of Fernald or other similar facilities can be used for military or peacetime purposes.

Silicon: rival for germanium

Du Pont has developed a process for manufacturing pure silicon for use in transistors, rectifiers and other electronic devices. The process, a result of Du Pont's pigment research, opens a virtually unlimited source of the element.

Silicon is expected to broaden the scope of electronic developments because it can withstand higher temperatures and handle more power than other semiconductors.

In transistors, silicon will move in on germanium. This is particularly true where temperatures go higher than 170 deg. F. Silicon functions up to at least 400 deg. F., which means that it not only can withstand more surrounding heat but can handle more power. Another important point: silicon is one of the most abundant elements in the earth's crust, while germanium is extremely rare.

In rectifiers, silicon will compete with selenium. The ability of silicon to withstand heat and handle greater power means smaller rectifiers with more capacity.

During World War II Du Pont developed a process for manufacturing coarse crystalline silicon that could be melted and alloyed without picking up impurities. It was used in wartime radar.

The pure silicon that Du Pont is now making is a brittle, gray, sparkling element with crystalline appearance. Specific gravity is 2.4, lighter than aluminum.

Present price tag is $430 a lb. But the silicon in a tiny wafer for a transistor costs only 2 to 4 c. Entire output, enough for research by U.S. electronic manufacturers and others, is now coming from a small pilot unit at Du Pont's Newport, Del., pigment plant. Meantime, Du Pont is continuing research on its new silicon production process.

Vacuum process rids ferrochrome of carbon

Ferrochrome extra low in carbon is now being produced by a new high-vacuum process at the Marietta, Ohio, plant of Electromet in what is probably the world's largest scale use of vacuum metallurgical techniques. Containing less than 0.025 percent carbon, ferrochrome made by the new Simplex process will be eagerly sought for steel mills turning out extra low carbon stainless.

In the key operation, carbon and silica react at about 2,000 deg. F. and under vacuum in the micron range. This converts the carbon to carbon monoxide.

The reaction takes place in a horizontal cylindrical furnace about 12 ft. in diameter and 150 ft. long. Four such furnaces are already running; four more, still under construction, will be ready by year's end. Carbon resistors in the upper part of the cylinder radiate heat to a charge of briquetted alloy in a bed about 12 in. thick on a specially built, extra-long flat car.

Feed for the Simplex process is ferrochrome produced in a standard arc furnace. It is ball-milled to a fine powder, mixed with a small amount of sand, and pelletized in a roll briquetting press.

In addition to the Simplex operation, the Marietta plant, when completed, will have 14 conventional submerged arc furnaces for production of ferroalloys and units for making electrolytic chromium and manganese.

Higher alcohols via sodium reduction

Higher alcohols, both saturated and unsaturated, will be produced from linseed, soybean and marine oils by an improved sodium reduction process in a new plant that Archer-Daniels-Midland will build at Ashtabula, Ohio. Glycerine and caustic soda will be important byproducts.

Manufacturing shortcuts in the sodium reduction process have been worked out by ADM engineers. The plant, currently under construction on a 40-acre site purchased from Cleveland Electric Illuminating, will have access to Lake Erie, be close to other transportation, get adequate power and abundant water. National Distillers will furnish metallic sodium.

Many higher alcohols will be made commercially for the first time when ADM's new plant gets into production in June 1954. Vegetable, animal and marine fats and oils will be the principal raw materials.

Since ADM is an important processor of linseed, soybean and marine oils, it's likely these will be used to make the new alcohols. Despite its widespread use for production of alcohols, cocoanut oil yields only 10 percent of alcohols above C_{18}. On the other hand, soybean oil produces about 92 percent of these higher alcohols and linseed oil 95 percent. Beef tallow, another commonly used raw material, produces about 65 percent of the higher alcohols and mutton tallow about 73 percent.

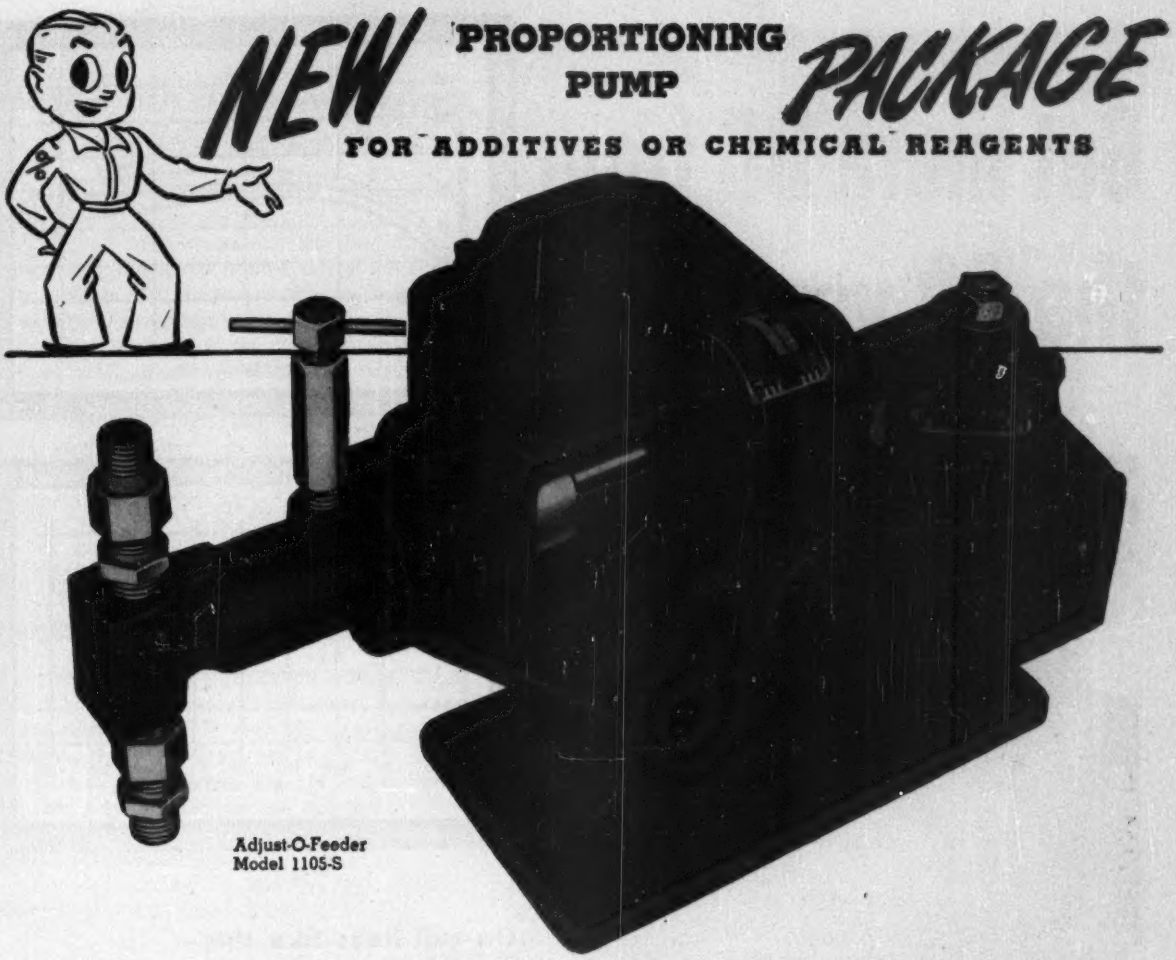
The new alcohols with higher purity and other advantages are expected to find a ready market in detergents. Other likely uses: vinyl plasticizers, lubricating oil additives, corrosion inhibitors, anti-foaming agents, peptizers for synthetic rubber, cosmetics, pharmaceuticals, antioxidants, agricultural chemicals, synthetic waxes and textile finishes.

While production of the new unsaturated higher alcohols will be a fresh venture for ADM, the company has been manufacturing fatty alcohols and glycerides

(Continued on page 106)

NEW PROPORTIONING PUMP PACKAGE

FOR ADDITIVES OR CHEMICAL REAGENTS



Adjust-O-Feeder
Model 1105-S

- LOW COST
- COMPACT
  Built-in standard motor — no separate gearbox or couplings.
  Built-in oil-enclosed gear reducer.
- MICRO-STROKE ADJUSTMENT
  Scale easily read — crank and connecting rod operate in horizontal plane.
- LONG LIFE AND EASY MAINTENANCE
  One-piece Meehanite iron frame for positive alignment of all moving parts.
  Double check valves on suction and discharge easily removable.

This new, compact proportioning pump, by %Proportioneers, Inc.%, is inexpensive and meets most requirements for a low capacity, medium pressure chemical feed pump. The standard Model 1105-S has a capacity range from 1 to 10 GPH and will discharge against pressures up to 650 psig. For lower feeds, the unit is available with a range of from 0.5 to 5 GPH. Complete and self-contained, Model 1105-S weighs less than 100 lbs. and is ready to operate.

Ask for Bulletin 1105

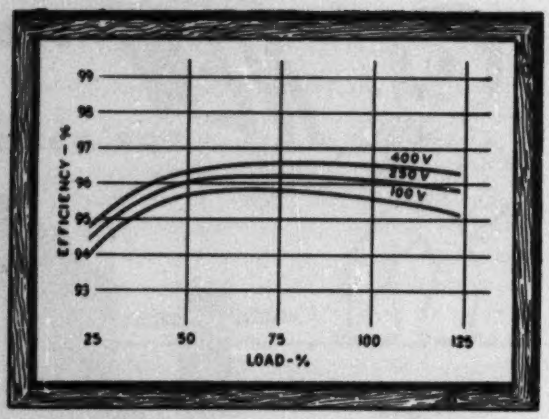
% PROPORTIONEERS, INC. %

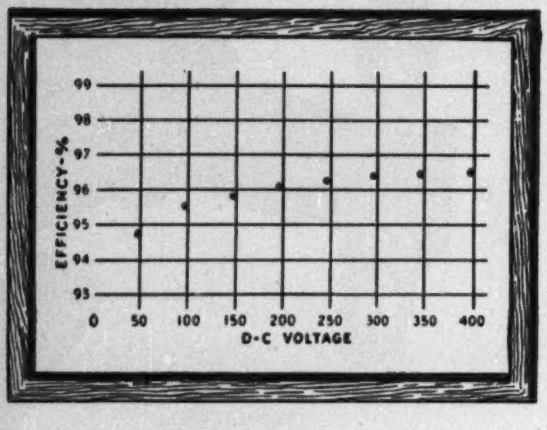
Write to %PROPORTIONEERS, INC.%, 369 Harris Ave., Providence 1, R. I.

Technical service representatives in principal cities of the United States, Canada, Mexico and other foreign countries.

Get more DC from the AC you buy

converting with *high-efficiency* I-T-E Mechanical Rectifiers





On cell lines like this—

or for heavy motor loads, metal refining, and other heavy current-using processes.

How much are you paying for lost power?

A substantial amount, probably, if you're converting AC to DC at low efficiency.

The two I-T-E Mechanical Rectifier efficiency curves, left, suggest substantial savings on power costs. 94% to 96% conversion efficiency is realized at any operating voltage, whether it's 50 volts or 400 volts. This same high efficiency is maintained from 25% to 125% of rated load current. And that's *over-all* efficiency—from a-c line to d-c bus.

In short, by converting with high-efficiency I-T-E Mechanical Rectifiers, plants can get up to 96 kwhr of direct current power for every 100 kwhr of alternating current they buy.

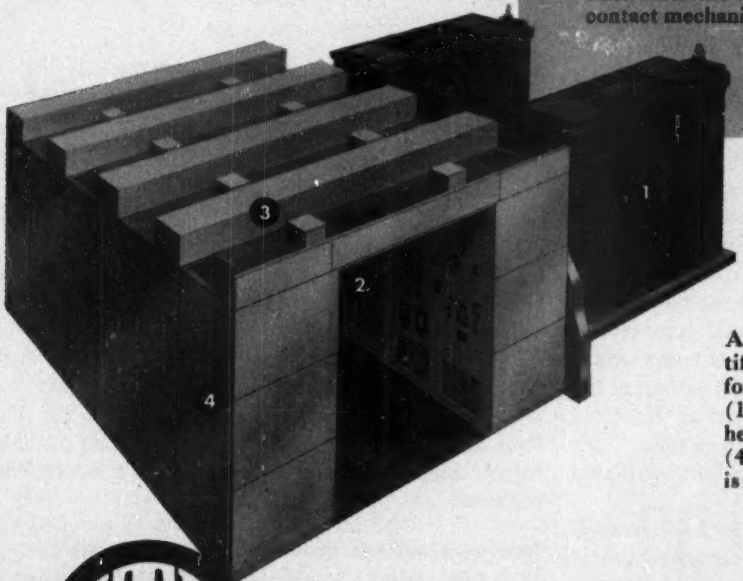
Increased efficiency means increased savings

For example: assume a 10,000 kw load, a power rate of ½ cent per kwhr, and continuous operation at 250 volts d-c. *Then*, for each 1% improvement in efficiency, yearly savings amount to *$3200 or more!*

High efficiency of the I-T-E Mechanical Rectifier (and resulting savings) are substantiated by thirty-seven units in service—more than 200,000 amperes of connected load.

For details, send for Bulletin 5205 or your nearby I-T-E Application Engineer.

10,000 ampere I-T-E Mechanical Rectifier supplying direct current to electrolytic chlorine cell line. Note the neat, compact arrangement of the contact mechanism (A) and the control panel (B).



A complete I-T-E Mechanical Rectifier installation includes: transformer and commutating reactor (1), contact mechanism (2), overhead bus (3), and d-c switchgear (4). Compact auxiliary equipment is built into compartments.

I-T-E

MECHANICAL RECTIFIERS

I-T-E CIRCUIT BREAKER CO. • RECTIFIER DIVISION • 19TH AND HAMILTON STS. • PHILADELPHIA 30, PA.

EPD—CANADIAN MFG. AND SALES: EASTERN POWER DEVICES, LTD., TORONTO

since 1936. At present ADM is making cetyl, stearyl and liquid alcohols from sperm oil at its Wyandotte, Mich., plant.

Use of linseed and soybean oils as major raw materials for higher alcohols is long past due, declares Vice President Frank C. Haas, who heads ADM's chemical operations. Linseed oil contains more than 800 combinations of fatty acids and soybean oil is almost as complex. These, thinks Haas, are two of the most promising but least explored of molecules.

Pair of new polyethylene producers for Texas

Breaking into polyethylene production, Dow Chemical and Eastman Kodak will both build plants in Texas. Dow plans to produce 25 million pounds per year at Freeport, and Texas Eastman 20 million pounds at Longview. Both will use the British ICI process.

Dow will invest $10 million to $12 million in the new plant. This will be backstopped by present power, water, raw material supply and other services that represent another $15 million of investment.

Dow's target for the start of manufacturing operations at Freeport is January 1955. A team of Dow engineers is in Britain now, learning how ICI makes polyethylene.

Construction starts this summer on the Longview plant of Texas Eastman. Earlier, the government had granted Eastman Kodak a fast tax writeoff for the proposed plant. For Eastman, with experience in the manufacture of ethylene, the move into polyethylene production was not only logical but shrewdly timed.

Electron beam toughens polyethylene

Bombarding plastics such as polyethylene with a powerful electron beam raises their flow temperature, toughening them to withstand steam and high temperatures. This curing process sets up cross links in the long polymer chain. It also makes the plastics more resistant to many solvents.

General Electric researchers at Schenectady, N. Y., first found that an electron beam could turn certain liquids into solids. This could be done at temperatures as low as —100 deg. F. By controlling the pattern of the electron beam, they found that only part of the liquid exposed to the beam was turned into a solid. This suggested new methods of casting and forming plastic products.

Bombarding polyethylene bottles for a few seconds with electrons from a million volt X-ray machine toughens the bottles so they can withstand steam sterilization. Thus polyethylene containers can now be used to package pharmaceuticals and biological fluids such as blood plasma, formerly carried only in easily sterilized glass. Polyethylene bottles not irradiated collapse at high temperature.

Electron beams are valuable in other ways. A beam can successfully depolymerize such natural substances as cellulose and wood. The electrons disrupt the lignin-cellulose complex, making the cellulose digestible. Electron beams can also be used to sterilize foods and biological fluids.

To produce the beam, explains Dr. C. G. Suits, GE vice president and director of research, the tungsten target is removed from a million volt X-ray machine of the resonant transformer type. Instead of peppering the target to produce X-rays, the electrons shoot into the open air through a small metal window.

It usually takes not more than 15 sec. of exposure in the electron stream to sterilize or toughen a material. At Pittsfield, Mass., GE's Chemical Division is now working on commercial development of the process.

New insecticide chemical from terpenes

By chlorinating a mixture of terpene hydrocarbons, B. F. Goodrich Chemical Co. has come up with a new chemical, dubbed Strobane, for the production of insecticides. It is still undergoing tests.

No aromatic solvent is required to hold the chlorinated terpene derivative in solution for spraying, as is often necessary with other chlorinated hydrocarbons. Nor is there any unwanted white residue.

Highly effective against many insects, the new chemical shows no limiting characteristics in toxicological tests. However, Goodrich has not yet sought authorization from the U. S. Department of Agriculture to sell Strobane. After further testing, Goodrich will increase output from experimental to semi-commercial quantities.

Another task for tricresyl phosphate

Shell Oil Co. is now adding tricresyl phosphate to its premium gasoline. Price of the gasoline has been increased a half cent, but Shell thinks the higher cost will be offset by better performance of the fuel.

The additive prevents carbon deposits from building up on spark plugs and in the engine. After testing it, Shell claims the new gasoline containing TCP will give the average car up to 15 percent more power, more mileage.

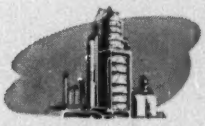
Du Pont chemists likewise endorse the idea that certain additives will decrease engine deposits and improve fuel performance. More importantly, the Du Pont researchers foresee new additives making possible higher compression ratios for tomorrow's automobile engines.

New acrylonitrile producer at Calvert City

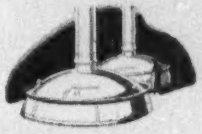
Acrylonitrile will be manufactured in a new $8.5 million chemical plant that B. F. Goodrich Chemical Co. will build at Calvert City, Ky., where it recently put its $6 million vinyl chloride plant on stream.

"The construction of this new plant further broadens the base of our chemical operations," explains Presi-

(*Continued on page 108*)



NOW... MORE NEW PRODUCTION FACILITIES



FOR HYDROFLUORIC ACID !

• See GENERAL CHEMICAL

FIRST IN FLUORIDES

for Anhydrous and Aqueous Hydrofluoric Acid

Most Versatile of all fluorine derivatives, Hydrofluoric Acid has ever-growing utility in industry. Demand for it ranges from the long-established uses of the aqueous form, to increasingly important process applications of the anhydrous acid as a catalyst and fluorinating agent.

To supply expanding needs, General Chemical has brought a large new "HF" plant into production at its Delaware Works near Philadelphia . . . adding once again to its already extensive Hydrofluoric Acid facilities

If you use "HF" in either form . . . or in any grade from commercial to reagent . . . you will find General Chemical is geared to serve you well from this new plant or from other locations across the country. For further information, just phone or write your nearest General Chemical office.

Uses of Anhydrous Hydrofluoric Acid

- As a catalyst in alkylation, isomerization, condensation, dehydration and polymerization reactions.
- As a fluorinating agent in organic and inorganic reactions.
- In production of fluorine.
- As a solvent for desulfurization.

Uses of Aqueous Hydrofluoric Acid

- For polishing, etching, frosting glass.
- For pickling certain metals.
- In electroplating.
- For cleaning stone, brick.
- In breweries to control fermentation.
- For dissolving ores; ore flotation.
- In laundry sours.
- For cleaning iron and steel castings.

GC Allied Chemical

BASIC CHEMICALS FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Offices in Industrial Centers from Coast to Coast

dent John R. Hoover of Goodrich, "and marks another step in the growth of Calvert City as a chemical manufacturing center."

Annual capacity of the new acrylonitrile plant, slated to begin operation in the fall of 1954, will be 24 million pounds. Acetylene for acrylonitrile production will be fed by pipeline from the nearby plant of Air Reduction Co.

Goodrich has long been a large user of acrylonitrile for the manufacture of synthetic rubber. The decision to produce its own came after five years of research, including successful continuous operation of a semi-works unit at its Avon Lake, Ohio, experimental station.

Catalytic process reforms naphthas

A new platinum catalyst, result of cooperative research by Sinclair Refining Co. and Baker & Co., Inc., is used in a new process for reforming naphthas into high-octane gasoline. M. W. Kellogg Co. will offer the reforming process.

This regenerative catalyst possesses two major advantages over other present commercial platinum catalysts: (1) the catalyst maintains high activity over considerably longer periods of time, resulting in substantially lower catalyst operating costs; and (2) it has a greater ability to convert low-octane paraffin components to high-octane aromatic gasoline.

Furthermore, Sinclair pilot runs show that the new Baker catalyst can produce attractive yields of high-octane product from a wide variety of feedstocks.

When it comes to the catalyst's long life, Sinclair and Baker point out that, economically, the process shows a decided superiority in barrels of feedstock processed per pound of catalyst consumed.

The new Kellogg process will be of the fixed-bed type of a new design specially developed for the Baker catalyst. Advent of the new process, however, will not diminish the importance of fluid hydroforming, Kellogg's molybdenum catalyst reforming process.

Right now, Baker is producing the platinum catalyst in its Newark, N. J., plant. But a new plant is being erected in New Jersey to turn out a vastly larger volume to meet the expected demand for the new reforming catalyst.

High carbamate conversion in new urea process

A new process for synthesizing urea, developed by Chemical Construction Corp., is currently being used commercially in Japan by the Sumitomo Chemical Co. Capacity of this plant is being tripled.

In Chemico's complete recycle process 76 percent of the ammonium carbamate is converted to urea per pass, nearly twice the conversion achieved with other present commercial processes.

Excess ammonia is separated from the autoclave product as a gas, condensed without compression, and recycled by pumping. Unconverted carbamate is decomposed, and the resulting mixture of ammonia and carbon dioxide separated to recover ammonia gas for recycle. Over-all ammonia efficiency is 97 percent.

Economies of the new urea process, points out President E. D. Powers of Chemico, include: (1) 70 percent more urea produced per pass at no increase in power consumption over other processes; (2) minimum corrosion; (3) simple and efficient recirculation of ammonia; and (4) ammonia recovery involving only about half the carbamate handled in other processes.

Equipment designed for the new process includes a unique granulator with a special spraying device that makes possible production of uniform spherical pellets with little recirculation of off-size product.

Vinyltoluene for paint vehicles

Dow Chemical will swing into volume production of vinyltoluene in a new unit at its Midland, Mich., plant early in 1954. Vinyltoluene, chemically similar to styrene, will be particularly valuable in paint vehicles.

It can replace styrene in synthetic rubber, rubber reinforcing resins, polyester resins and molding powders. But its biggest opportunity will come in paint vehicles.

Styrene has been used increasingly in such paint vehicles as styrenated oils and styrenated alkyds. But styrene will react to form usable paint vehicles with only certain drying oils.

Now it's been found that vinyltoluene will react to form clear useful vehicles with all of the commercially important drying oils. To alert paint makers, already testing vinyltoluene from Dow's pilot plant, this points to new improved paints and finishes.

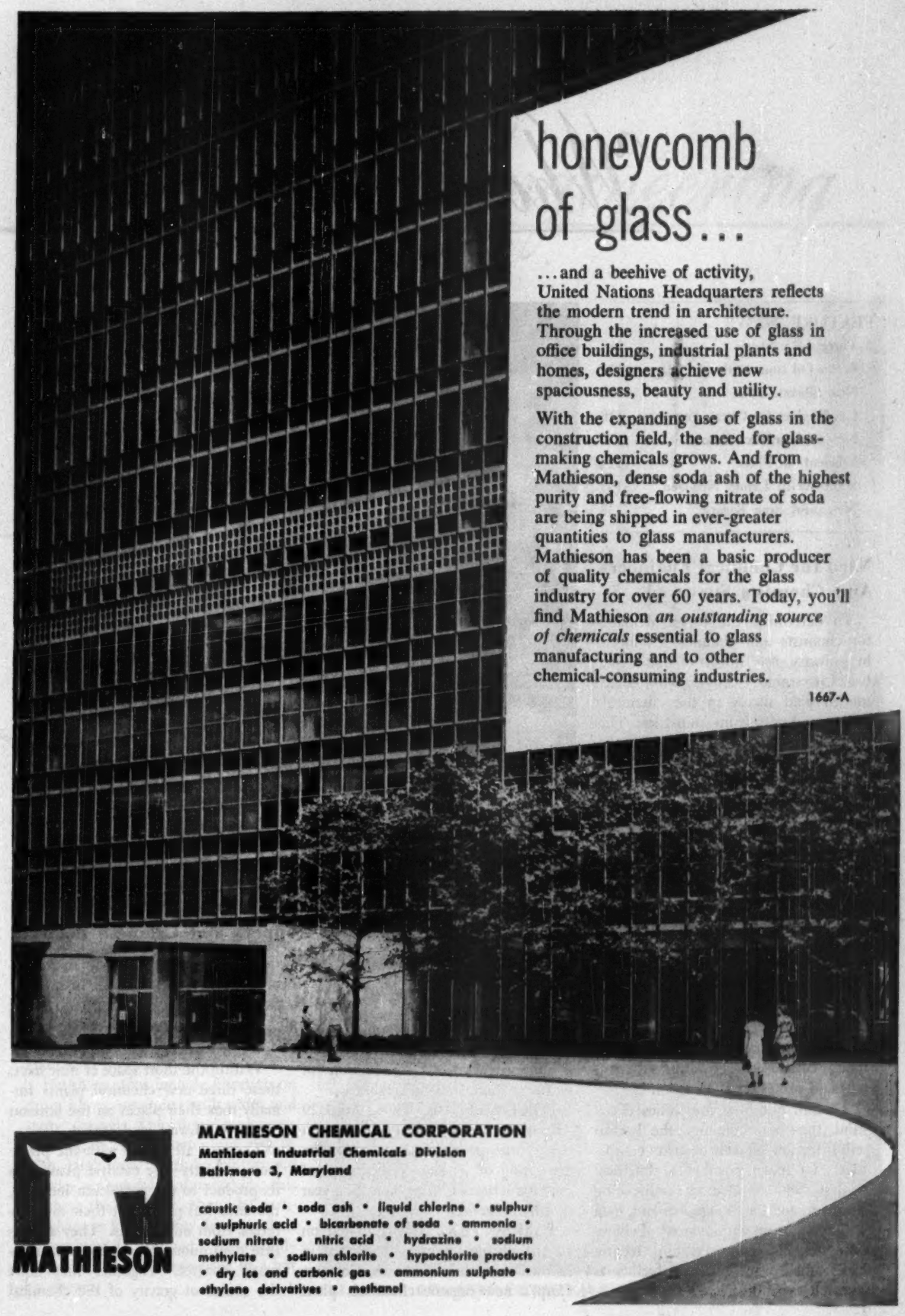
Fresh air for the silent service

Oxygen will be generated from purified sea water in a new cell being developed and built by M. H. Treadwell Co., Inc., of New York for the U. S. Navy. The equipment would be used aboard submarines.

An electric current decomposes water in the cell, producing oxygen and hydrogen. With fresh oxygen for the crew to breathe, a submarine wouldn't have to surface to replenish its air. Thus, as far as its oxygen supply is concerned, the sub could stay submerged for long periods. The hydrogen would be exhausted from the vessel.

Because of operating conditions, the cell differs radically from conventional designs. Not only must it operate at extreme inclinations and during violent motion, but it is also designed to produce the gases directly at pressures up to 3,000 psi. It will be equipped with automatic controls and safety devices to a degree unattempted heretofore in industrial electrochemical operations.

What's Happening, turn to page 110



honeycomb of glass...

...and a beehive of activity, United Nations Headquarters reflects the modern trend in architecture. Through the increased use of glass in office buildings, industrial plants and homes, designers achieve new spaciousness, beauty and utility.

With the expanding use of glass in the construction field, the need for glass-making chemicals grows. And from Mathieson, dense soda ash of the highest purity and free-flowing nitrate of soda are being shipped in ever-greater quantities to glass manufacturers. Mathieson has been a basic producer of quality chemicals for the glass industry for over 60 years. Today, you'll find Mathieson *an outstanding source of chemicals* essential to glass manufacturing and to other chemical-consuming industries.

1667-A

MATHIESON

MATHIESON CHEMICAL CORPORATION
Mathieson Industrial Chemicals Division
Baltimore 3, Maryland

caustic soda • soda ash • liquid chlorine • sulphur • sulphuric acid • bicarbonate of soda • ammonia • sodium nitrate • nitric acid • hydrazine • sodium methylate • sodium chlorite • hypochlorite products • dry ice and carbonic gas • ammonium sulphate • ethylene derivatives • methanol

What's Happening

FEATURE NEWS

Three New Plants	110
Better Oil from Shale	114
New Silicone Plant	116
Gas Engines for Cheap Power	118
New Carbon Black Process	120
Efficient Air Filter	124
Scrub With Liquid Nitrogen	133
Newsprint from Bagasse	136

Need for Chemical Engineers And Chemists Surveyed

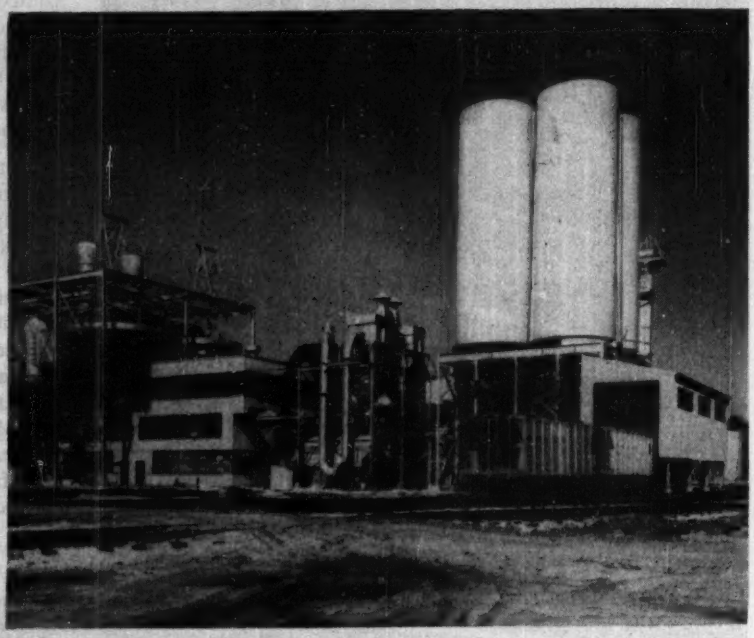
To determine the future demand for chemists and chemical engineers by industry, the Bureau of Labor Statistics is currently carrying on a three-month field survey in the chemical, rubber and petroleum industries. The Department of Defense called for the survey.

"Although the gravity of the scientific manpower situation is widely recognized," declares Commissioner Ewan Clague of BLS, "no adequate information exists on the current and prospective demand for scientific personnel."

Such information is needed by the government, professional societies, persons responsible for vocational guidance and private companies.

By its pilot survey, the bureau will make a start in furnishing the needed information. Plans for it were developed in cooperation with officials of many companies, government agencies and professional societies.

To find out how companies determine their requirements, the bureau will interview officials of many companies. To make possible a statistical analysis of the factors influencing short-run and long-range demand, data will be asked on employment of chemists, chemical engineers and technicians and on such related factors as research expenditures.



DAVISON CATALYST PLANT, Lake Charles, La.

Three New Plants Open

Southwest area continues to dominate the plant expansion scene as Davison, Koppers and Celanese dedicate new chemical production units.

LAKE CHARLES, LA., April 28—Gov. Robert F. Kennon formally dedicates Davison Chemical Corp.'s new $7-million plant for production of synthetic fluid cracking catalyst.

PORT ARTHUR, TEX., April 29—Koppers Co. makes its first major entry into petrochemicals with the dedication of its new Williams plant for production of 90 million lb. a year of ethylbenzene.

PAMPA, TEX., May 7—Based on an entirely new process developed in its own research laboratories, Celanese Corp.'s new organic chemicals plant observes its official opening with appropriate ceremonies.

Within the short space of nine days, these three new chemical plants formally took their places on the horizon of the Southwest landscape.

They are all tied in with the petroleum industry—the catalyst plant sells its product to the petroleum industry, the chemical plants get their raw materials from oil and gas. They all feature continuous processing and automatic control. Together they shift the center of gravity of the chemical

industry southwestward by several miles.

Davison Catalyst Plant

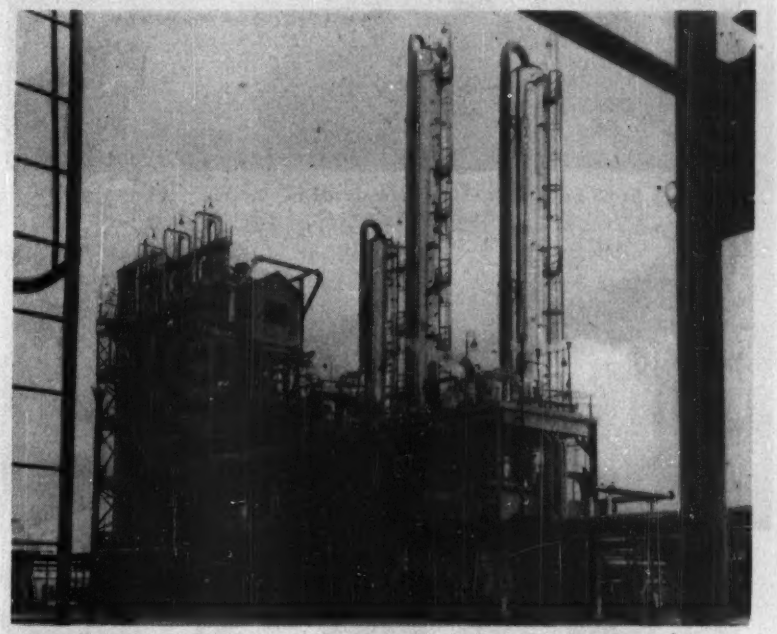
Rated capacity of the new plant is more than 60 tons per day of microspheroidal catalyst. With the addition of the Lake Charles facilities to other operations at Baltimore and Cincinnati, Davison's capacity for production of synthetic cracking catalyst now exceeds that of the remainder of the industry, according to M. G. Geiger, vice chairman of the board.

Lake Charles is a logical spot for such a plant. Its principal customers are in the area from Baton Rouge to Houston. Raw materials are all available in the area. The site has deep water shipping facilities.

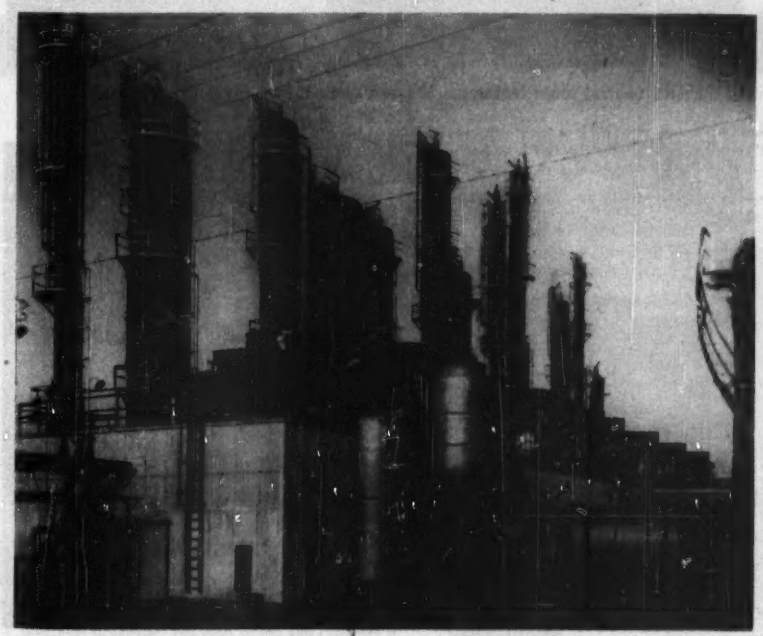
First step in catalyst manufacture is the formation of a silica hydrogel by mixing sulfuric acid and sodium silicate in the proper proportions. This hydrogel is collected in large cypress tanks (see cut, next page) and is kept well mixed with paddle agitators. The mixture is blended with more acid, and the resultant hydrosol is kept running continuously through an agitated wood tank, where dilute ammonia solution is added.

The ammoniated mixture is reacted with an aluminum sulfate solution prepared in the plant from sulfuric acid and aluminum hydrate. Chemical processing is completed by adding more ammonia solution to precipitate aluminum hydroxide.

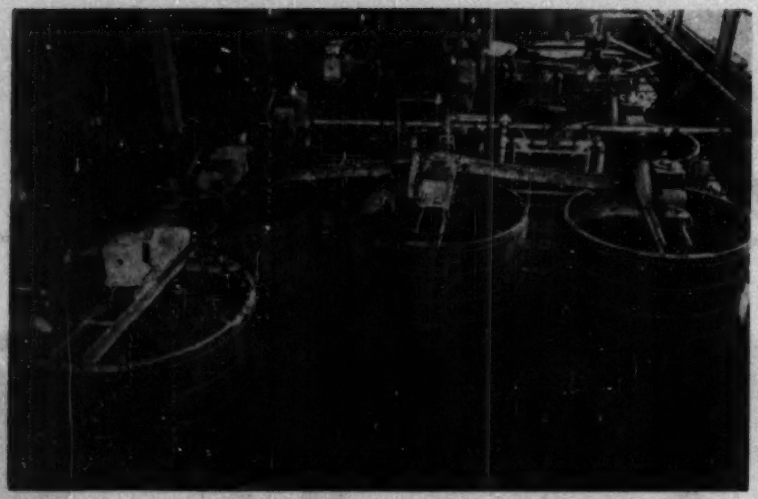
Finishing steps include filtration on drum filters, repulping with water and spray drying. The three dryers are each 22 ft. in diameter and 50 ft. high. High-pressure triplex pumps and nozzles are used for atomization; this is where the ultimate spheroidal particle shape is fixed. Spray-dryer product is reslurried, filtered, thoroughly washed and finally flash-dried in a hot air stream.



KOPPERS ETHYLBENZENE PLANT, Port Arthur, Tex.



CELANESE ORGANIC CHEMICALS PLANT, Pampa, Tex.



DAVISON USES a cascade system of cypress tanks for carrying out its reactions.

KOPPERS control room features a 72-point console-type temperature indicator.

CELANESE handles 80 percent of process cooling load in air-cooled exchangers.

Koppers Ethylbenzene Plant

Adequate supply of ethylene by pipeline from Gulf Oil Corp. was the feature which attracted Koppers to Port Arthur. However, benzene has to be brought in from oil refineries and coke plants over a wide area and the ethylbenzene product has to be shipped all the way to Kobuta, Pa., for conversion to styrene.

There's more to Koppers plans, though, than now meets the eye. Significantly, the new plant occupies only a small portion of the 1,050-acre site. As stated by J. P. Williams, former company president and board chairman, "We in Koppers foresee our major growth in the chemical field with the promise of our expansion here."

Ethylbenzene is made by the alkylation reaction of benzene and ethylene, using an aluminum chloride catalyst. Dry high-purity benzene, ethylene, recycled polyethylbenzenes and aluminum chloride complex are continuously fed into a reactor, where conversion into ethylbenzene occurs.

Acid alkylate overflows to a decanter, where most of the $AlCl_3$ settles out and is recycled. The overflow is neutralized with caustic, separated from the aqueous phase, and purified in a series of fractionation towers.

In the first tower unreacted benzene is removed overhead; it is recycled through an azeotropic drying tower back to the reactor. High-purity ethylbenzene is taken off the next tower. In the final tower polyethylbenzenes are flash-vaporized and returned to the reactor.

Celanese Organic Chemicals Plant

Based on the catalytic air oxidation of butane, the new Pampa plant produces a variety of organic chemicals, chief of which are acetic acid and anhydride. Design capacity in terms of acetic acid is 1.8 million lb. per week.

In addition to these two products, the new plant's specialties unit, which started up on May 2, is producing acetaldehyde, methanol, acetone, propionic and butyric acids, butyl acetate and propyl acetate. A new unit for making vinyl acetate was scheduled to go into operation in June; design capacity is 30 million lb. a year.

Although Celanese's Gulf Coast plant at Bishop, Tex., and the Pampa plant, in the Panhandle area, use similar raw material and produce the same

Take a NEW LOOK at
EPICHLOROHYDRIN

WHEN SOMETHING has been around for a while, like Epichlorohydrin, it's apt to be taken for granted. If you're working with this product, you know what it can do for you; but if, after a first look, you found no immediate use for Epichlorohydrin, you may never have thought about it since. If so—*Take a new look at Epichlorohydrin!*

Many new applications have been developed for it—so many, in fact, that Shell Chemical has just built another plant to increase the supply.

What is Epichlorohydrin doing today? It's a *practical intermediate* in the manufacture of adhesives, dyestuffs, solvents, plasticizers, cosmetics and resins for surface coatings. It's a *successful stabilizer* in the formulation of industrial chlorinated compounds and chlorinated insecticides. *It's being actively explored* for use in fumigants, surface-active agents, humectants, detergents, and ion-exchange resins.

Just send the coupon, clipped to your letterhead, for a book that has been prepared specially to answer your questions about "Epi".

(CE)

SHELL CHEMICAL CORPORATION
50 West 50th Street, New York 20, N. Y.
Attention: Department A

Please send me the 56-page book SC:49-35 "Epichlorohydrin."

Name_____

Title_____

Address_____

City_____ State_____

SHELL CHEMICAL CORPORATION

CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE

EASTERN DIVISION: 500 Fifth Avenue, New York 36 • WESTERN DIVISION: 100 Bush Street, San Francisco 6
Atlanta • Boston • Chicago • Cleveland • Detroit • Houston • Los Angeles • Newark • St. Louis
IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Toronto • Montreal • Vancouver

basic product line, the company reports that the two plants use entirely different process conditions. The Pampa plant uses higher pressures and lower temperatures than are used at Bishop. Some of the pressure is recovered by using waste nitrogen to drive the turbines.

The separation system which handles the reaction products from the oxidation unit is based on distillation, absorption and extraction towers using perforated plates exclusively. This is thought to be the first time that this type of tower has been installed on a plant-wide basis.

Although the Pampa location is ideal from the standpoint of cheap butane, it is in an area in which irrigation by well water is widely used by the farmers. Celanese decided to depend as much as possible on air cooling, to the extent of some 80 percent of the total cooling load. The plant boasts one of the largest single installations of air-cooled exchangers in the world.

Goodyear Expanding Its Output of Chemicals

Goodyear Tire & Rubber Co. this year will invest about $5.5 million in plant expansion to meet increasing demand for its chemical products.

Chemical facilities at Akron, Ohio, and at Niagara Falls, N. Y., will be expanded. This will increase the output of accelerators for use in rubber compounding and of other chemicals.

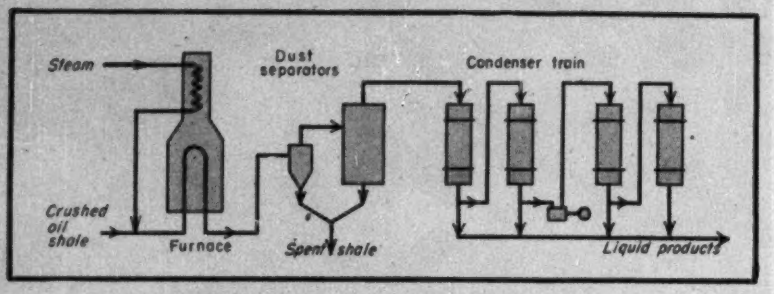
Here's how the expansion breaks down:

In Akron, a $1.5 million addition to its rubber plant will provide for increased production of synthetic rubber resin base for masonry and concrete surface paints, and for added output of paint latex and synthetic rubbers.

In Niagara Falls, a new plant and added equipment to cost about $4 million will make possible production of accelerators for rubber, antioxidants and vinyl plastic resins.

Ground has been broken for the Akron plant addition. Construction at Niagara Falls is expected to get under way this summer.

Four new units will comprise the Niagara Falls expansion. They will be erected on a 10-acre site next to the company's present Pathfinder Chemical Corp. plant.



Better Oil From Shale

New Bureau of Mines continuous oil-shale retorting system produces high-quality crude oil containing a large percentage of gasoline. Retorting time cut to 3 seconds.

A pipeline retort for oil-shale distillation, under development at the Laramie, Wyo., station of the Bureau of Mines, is showing promising results, according to a recent announcement by J. H. East, Bureau regional director.

Preliminary test operation of a 1-ton-a-day pilot unit shows good yields of high-quality oil and high-octane gasoline, both said to be far superior to those produced in other types of retorts. In addition, large quantities of aromatic chemicals, such as benzene and toluene, are obtained, together with such important materials as ethylene, propylene, butylene and butadiene.

Results obtained with this retort have so interested one of the major chemical companies that it is exploring the possibilities of using oil shale as a source of strategic chemicals now in demand, the Bureau says.

► **Fast Exposure**—In the new process, oil-shale particles, crushed to minus ¼ in., are picked up continuously by a stream of superheated steam and carried swiftly through a tubular retort contained within a gas-fired furnace. The alloy-steel hairpin retort tubes are 3½ in. in diameter. Temperatures can range from 900 to 1,800 deg. F.

Time of exposure in the furnace is only 3 sec., as compared to hours in batch-type units. The feed rate or hr. per sq. ft. of retort tube cross-sec- shale handling capacity is 8,050 lb. per tional area.

Coming out of the furnace, the vapor-solid mixture goes through a series of cyclones and dust separators. Here, 98 percent of the spent shale is removed.

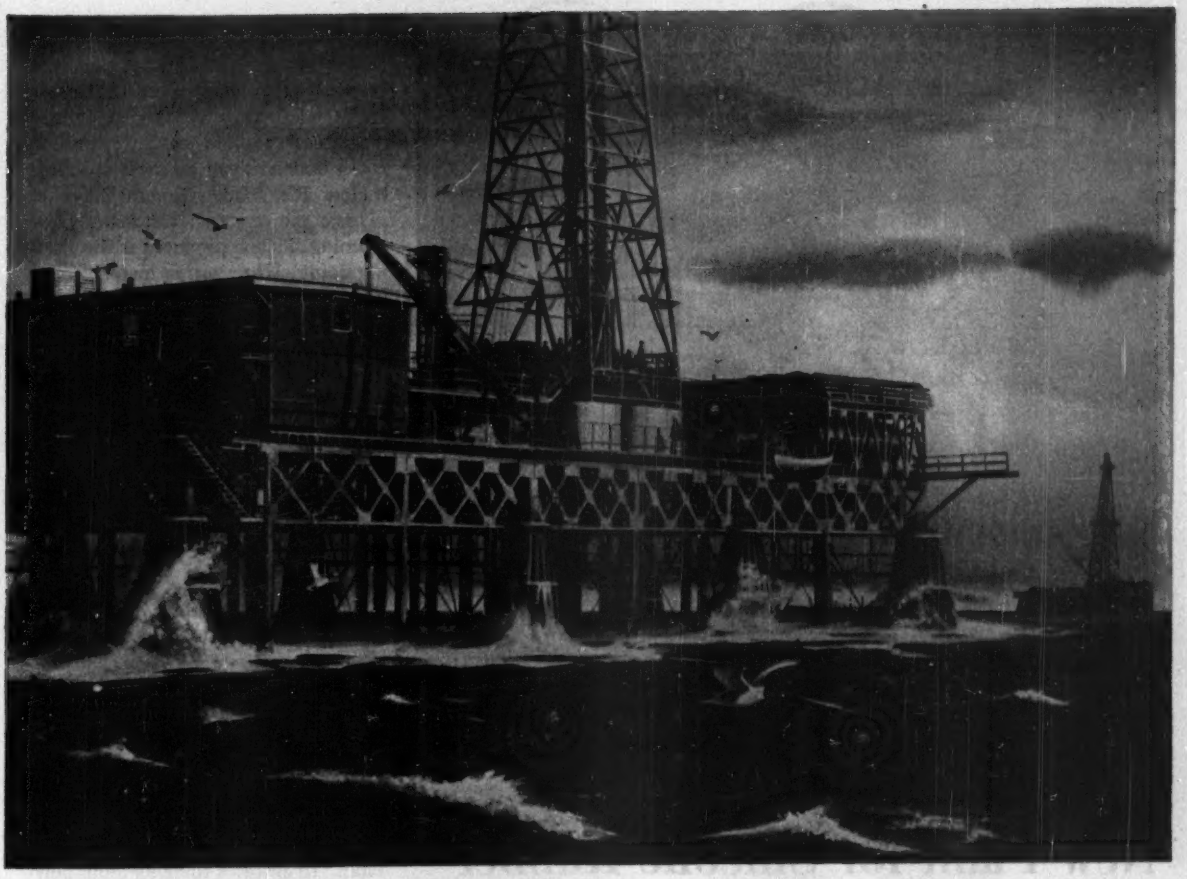
Next is the vapor recovery system. This consists of two main parts—two water-cooled condensers operating at atmospheric or retort pressure that remove the water and heavy oil vapors, and two additional condensers, one water-cooled and one refrigerated, that operate at 100 psi. and remove the lighter vapors.

► **Heat Balance**—Although convenient natural gas is used to fire the furnace, fuel oil produced in the process could be used equally well. Moreover, while steam from a low-pressure boiler is now being employed as the entraining medium, any entrainment gas could be used. Flue gases superheat the steam before entering the stack.

Crude oil yields as high as 21 gal. per ton have been obtained from shale analyzing 30 gal. per ton, and naphtha yields have been as high as 6½ gal. per ton. Considerably more gasoline can be made from the retort gases and by hydrogenating the heavy oil fractions.

► **Small Particles Only**—A disadvantage of the new process is that it requires finely crushed shale, and crushing could be expensive.

However, a commercial pipeline retort might well be operated to advantage in conjunction with a conventional retort, using shale fines which are unsuitable for other operations. Also, says the Bureau, it is possible that the value of the premium oil products obtained will be more than enough to pay for the costs of preparing finely crushed shale in an independent operation.



OVER OR UNDER...LAND OR SEA...BROWN & ROOT'S EXPERIENCE CAN SAVE YOU MONEY . . . TIME!

Four decades of diversified experience in heavy construction and engineering has developed a "know-how" for Brown & Root which can be invaluable to you. Over the years Brown & Root's technological developments have provided important savings of time and money for many clients.

Regardless of your interest, be it in finished products—fabricated parts or basic materials Brown & Root can help you. Centralized responsibility coordinates engineering and construction. This plus loyal personnel will save your firm time . . . money.

If your company contemplates new construction or plant expansion a call from you will place Brown & Root plant planning experts at your disposal.

BROWN-BILT

BROWN & ROOT, Inc. *Engineers • Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

FILLERS and pigments are added in this twin-bladed mixer, part of the . . .

New Plant for Silicone Rubber

Dow Corning ups capacity to 500,000 lb. per month. Greater supply will satisfy the military, make more product available to industry.

Less than ten years ago silicone rubbers were unknown to industry. Now, almost coincident with its tenth anniversary, Dow Corning Corp. (Midland, Mich.) has quintupled its capacity with a new plant. And there is plenty of room in the 45,000-sq. ft. building to allow for another threefold expansion to 1.5 million lb. a month—a figure Dow Corning feels may be required in just a few more years.

Before the new plant started production Dow Corning's Silastic capacity was 100,000 lb. per month. Most of its output was soaked up by military demands — various aircraft uses, cable insulation in naval vessels, ordnance items, etc.—leaving little for industry. This situation is due to change, and a number of industrial applications based on Silastic's flexibility over a wide temperature range, good electrical properties and moisture resistance can be foreseen.

▶ **Versatile Material**—Silicone rubber gaskets perform well under a variety of conditions—in contact with hot oils, ethylene glycol, lower alcohols, acetone, wet chlorine, low-pressure steam or hot air. Silicone rubbers give off no volatiles even at high temperatures, hence use under high vacuum is possible.

As caulking compounds the rubbers can be used on furnaces without flowing and in low-temperature rooms without becoming brittle. They can be used as seals in drug and food processing where sanitary conditions must be met, also as diaphragms for control valves in hot locations and for electrical insulation.

Ozone resistance is good, indicating use on ozone generators and nearby equipment. As wire insulation Silastic has good resistance to corona discharge, weathering and ultraviolet light.

Few things stick to silicone rubbers, hence they are excellent for conveyor belts or other equipment contacting sticky materials. Wide temperature ranges from molten plastics to chilled sticky materials can be easily handled.

▶ **How It's Made**—Dimethylsiloxane, a basic raw material for many Dow Corning silicone products, is the starting point. The starting material used is a low polymer whose chain consists of three to six monomer units. Polymerization is carried out in a reaction kettle in the presence of heat and certain organic catalysts. During this operation chain length increases into the hundreds.

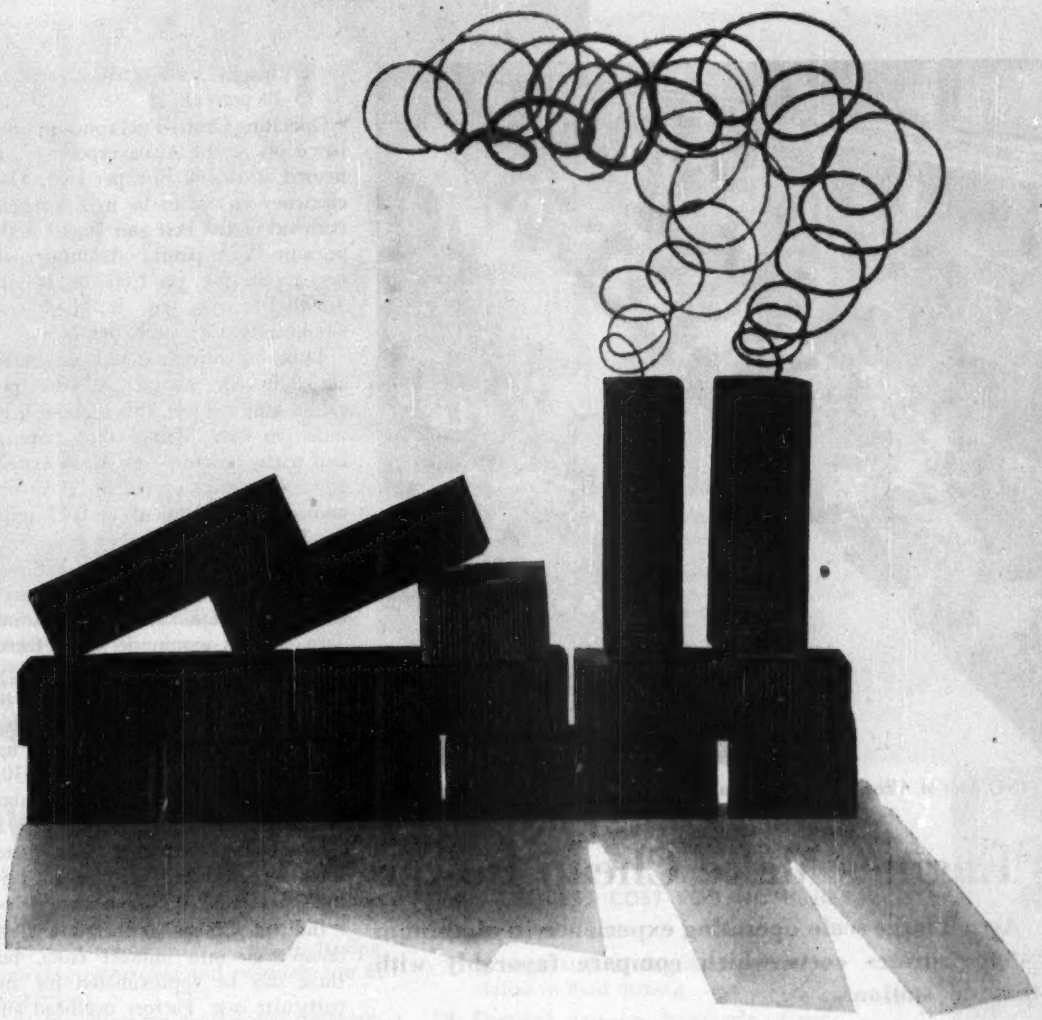
The medium polymer then passes to twin-bladed sigma mixers (150 or 300 gal. capacity) where various fillers and pigments are blended in. Up to 30 percent "silica soot" is added as a filler for strength and 1 to 2 percent pigment for color.

Some of this compounded material passes on to any one of several small two- and three-roll mills where special stocks and pastes are compounded. Some pastes are used on furnaces and other caulking jobs. Some may be put into solution by the customer and used for coating glass-fabric electrical tapes. In all cases these medium polymers are set up if processed by heat.

Most of the compounded material, however, passes on to the large 60-in. and 84-in. two-roll mills where the vulcanizing agent (2 percent benzoyl or other organic peroxide) is blended in. Additional heat during this operation brings the chain length of the polymer up into the thousands. Some of this material may be dispersed in xylene or other solvents for use in dip-coating fabrics, etc., but the bulk of it goes to the sheeting operation.

Although the milling room is pressurized to avoid product contamination, as a further safeguard against contaminants the rubber is forced through a fine filter screen backed up by a perforated steel plate. The ¼-in. diameter spaghetti-like strings issuing from the plate are recombined in a a two-roll sheeting mill and end up as a ⅛-in. sheet. These sheets are compacted into 5- and 25-lb. blocks.

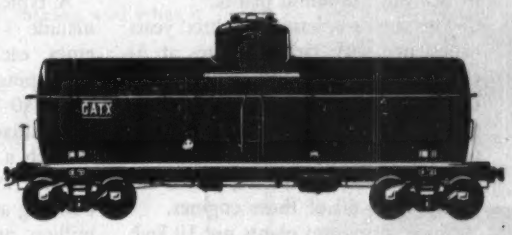
Customers soften these blocks in a two-roll mill and proceed with further fabrication in a number of ways. The silicone rubber might be extruded, calendered and fabricated like natural rubber, molded into parts or sponged.



BEFORE YOU START *laying bricks for your new plant,*

see General American about GATX cars

to carry your bulk liquids

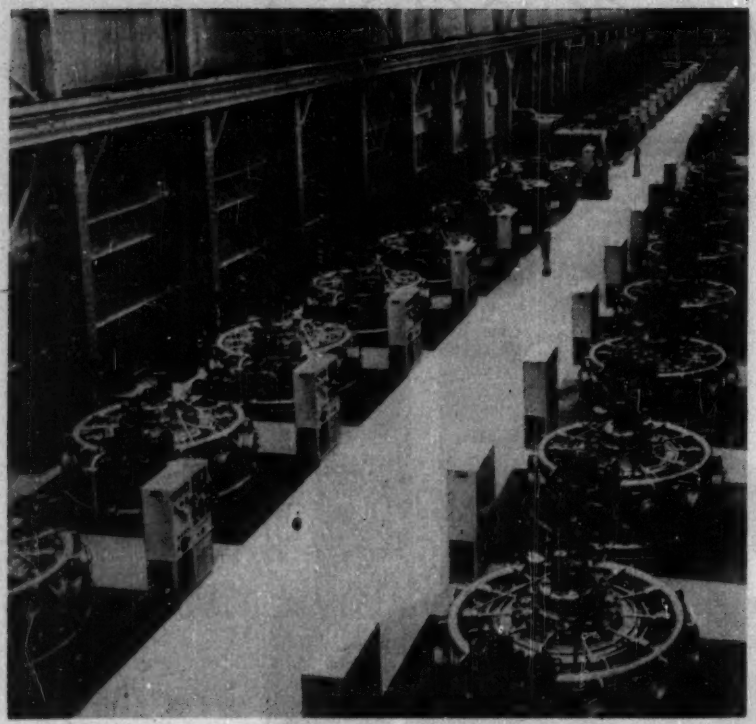


For dependability, the 45,000 tank cars in the GATX fleet are designed, built and operated by General American

GATX GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street · Chicago 90, Illinois
Offices in all principal cities



OPERATING floor at Alcoa plant; direct-connected generators are below floor.

Gas Engines Make Cheap Power

Actual large-scale operating experience in aluminum plants demonstrates costs which compare favorably with steam-turbine stations.

D.c. power can be produced by engine-driven generators at a total direct cost of less than 2 mills per kwh., according to data recently released by Nordberg Mfg. Co., Milwaukee, maker of the radial gas engines used in two big aluminum plants.*

This figure is based on three years' experience with radial engines at Alcoa's Port Lavaca, Tex., plant. Alcoa originally installed 120 of these engines, later added 74 more; total capacity is about 220,000 kw. The new Kaiser plant at Chalmette, La., is currently using 80 of these engines.

Since aluminum plants use 10 kwh. per lb. of output, low-cost power is essential. Aluminum producers must locate near either large hydroelectric stations or have a source of cheap fuel. Natural gas is the big attraction in the Gulf Coast area.

*R. W. Bayerlein, Nordberg vice president, presented these figures at an AIME meeting in Los Angeles on Feb. 17. See also *Chem. Eng.*, July 1950, p. 102.

▶ **Engines vs. Turbines**—Nordberg figures that a d.c. gas-engine generating station can be built for a cost per installed kw. competitive with an a.c. steam-turbine station using larger individual units.

A typical gas-engine station would include 37 twelve-cylinder radial engines, each rated at 2,125 hp. and developing 1,350 kw. of d.c. power plus 150 kw. of 26-cycle a.c. power for auxiliaries. Total installed capacity of such a station, therefore, is about 50,000 kw. Total cost, including building and auxiliaries, is about $8.4 million, or $168 per kw.

The gas-engine station doesn't need any a.c.-d.c. conversion equipment; this saves about $60 per kw. in investment costs. Another advantage of an engine installation is that the large number of individual units permits reasonable continuity with only 10 to 15 percent spare capacity. With large steam units, Nordberg points out, spare capacity must often amount to 33 to 50 percent.

▶ **Operating Costs**—Fuel consumption, based on recent Alcoa experience, is figured at 10,500 Btu. per kwh. This efficiency is said to be in the neighborhood of the best and largest high-pressure steam plants. Assuming natural gas at 10 c. per 1,000 cu. ft. and 1,000 Btu. per cu. ft., fuel cost amounts to 1.05 mills per kwh.

Lube oil consumption is estimated at 3,000 kwh. per gal. At 40 c. per gal. in tank car lots, this is about 0.13 mills per kwh. Maintenance material and parts, according to Alcoa experience, are easily covered by $1.50 per annual hp., equivalent to 0.27 mills per kwh.

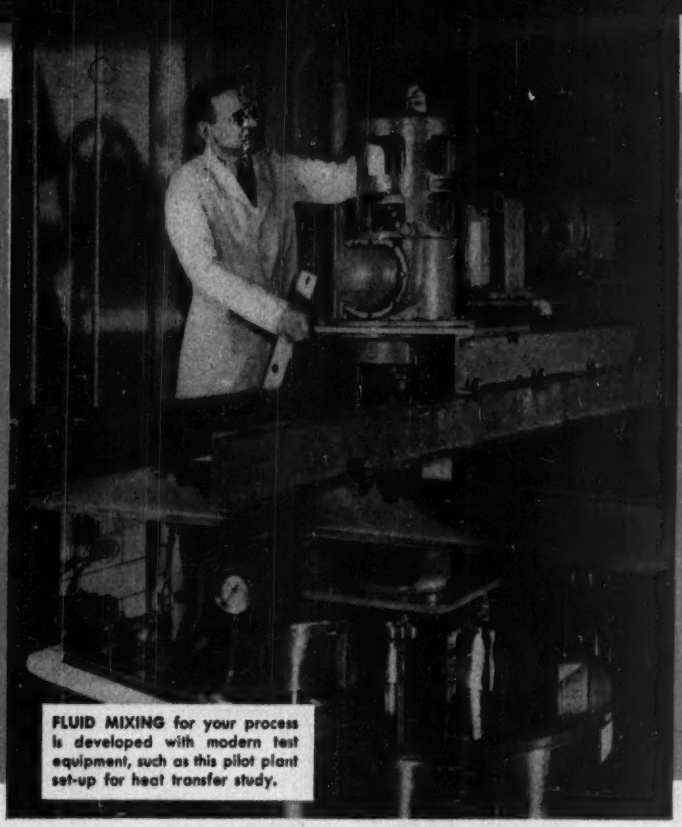
Labor cost will vary with the size of the installation. A crew of 35 men can attend one 37-engine station. Two stations require 59 men, three, 84 men. These crews include everyone from the supervisory engineers down to the janitors. Total monthly payrolls for the three crews are figured at $13,000, $21,000 and $30,000, respectively. This puts the labor cost at 0.29 to 0.39 mills per kwh.

Total direct operating costs, therefore, are estimated at 1.74 to 1.84 mills per kwh.

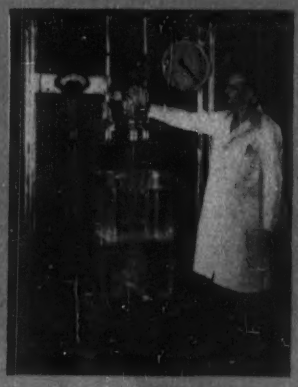
▶ **Indirect Costs**—Nordberg's analysis doesn't go into indirect costs, but these can be approximated for any particular case. Factory overhead and general administrative expense, for example, would probably run about 0.20 mills.

Based on experience to date, Nordberg estimates that these engines will run 20 to 30 years with practically no bearing troubles. A depreciation rate of 5 percent per year, therefore, seems reasonable. Taxes and insurance might be estimated at another 2 percent per year. This 7 percent on investment adds another 1.34 mills to the cost of power.

Total estimated cost, based on these figures, is about 3.3 mills per kwh. However, since the investment in the generating station must show the same earnings rate as the entire aluminum plant, the final analysis must allow for a reasonable profit on operation of the generating station. If this profit is figured at 15 percent on investment before income taxes, the true value of power comes out about 6 mills per kwh., still pretty cheap for fuel-based electricity.



FLUID MIXING for your process is developed with modern test equipment, such as this pilot plant set-up for heat transfer study.



IMPELLER FLUID REGIME is studied by means of ultra-high-speed motion pictures, to determine optimum balance of flow and shear.

PILOT AND SEMI-WORKS testing is done in tanks as large as 70,000 gallons. Big test equipment helps to insure scale-up accuracy.

How to be *SURE* of fluid mixing results

Don't be satisfied with "just average" fluid mixing.

There's a tremendous bonus in having the mixing *researched* and *engineered* to fit your process.

You can often get sensational time savings—cut process time down from hours to minutes.

Correct mixing can give you tight control of a critical process. Control of dissolving rate, gas bubble size, crystal size, heat transfer coefficients.

You can often combine mixing operations—stack up a series of tanks into a vertical column to save plant space, process time, equipment cost.

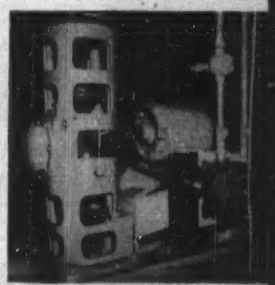
THESE SERVICES COST YOU NOTHING

At MIXCO you'll find:

1. A large staff of engineers who specialize in fluid mixing.
2. Detailed data on thousands of successful mixer installations.
3. Scale-up methods that are guaranteed accurate.
4. Full guarantee of successful results.

You can save many months by using these unique engineering facilities, without cost or obligation. Write us today for full details about engineered fluid mixing and what it can do for *you*.

Lightnin® Mixers



TOP ENTERING—turbine and paddle types. Sizes 1 to 500 HP.

SIDE ENTERING—propeller type. Sizes 1 to 25 HP.

PORTABLE—electric or air driven. Sizes ⅛ to 3 HP.

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc.

128 Mt. Read Blvd., Rochester 11, N. Y.

In Canada: William & J. G. Greey, Ltd., Toronto 1, Ont.

- ☐ DH-50 Laboratory Mixers
- ☐ B-75 Portable Mixers (electric and air driven)
- ☐ B-102 Top Entering Mixers (turbine and paddle types)
- ☐ B-103 Top Entering Mixers (propeller type)
- ☐ B-104 Side Entering Mixers
- ☐ B-105 Condensed Catalog (complete line)
- ☐ B-107 Mixing Data Sheet

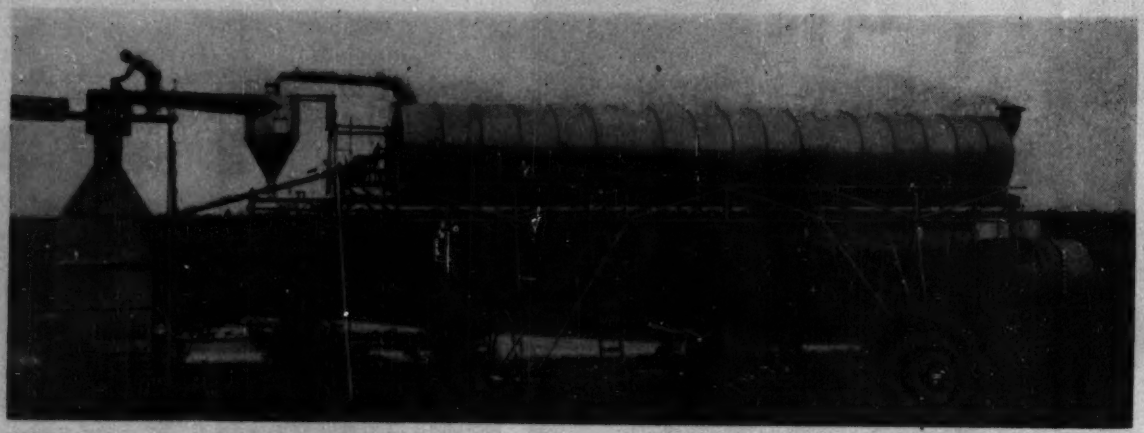
Please send me the catalogs checked at left.

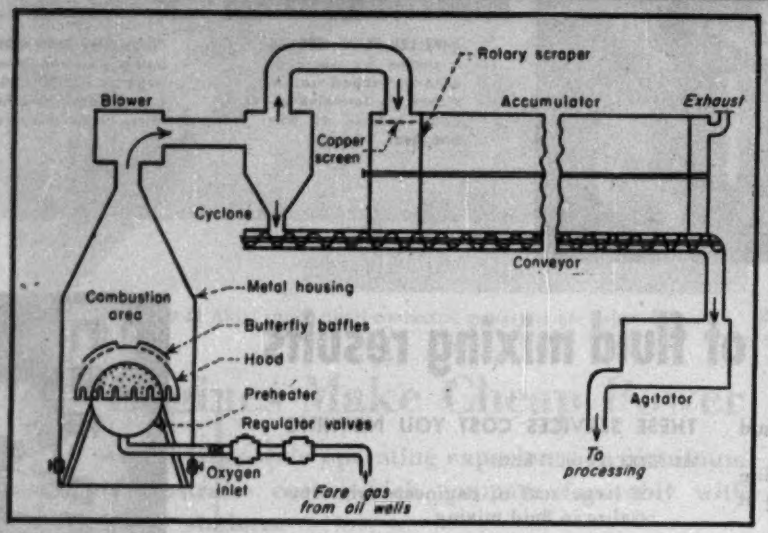
Name_____ Title_____

Company_____

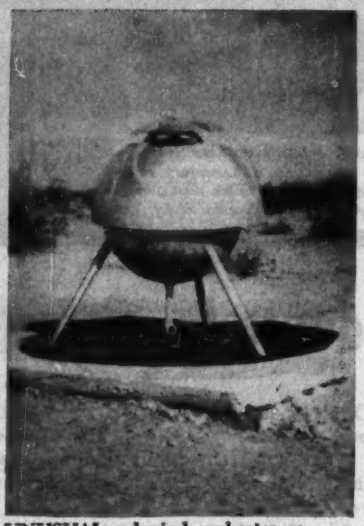
Address_____

City_____ State_____





TREMENDOUS yields are achieved by rapid product removal and by using this . . .



UNUSUAL spherical preheater as . . .

New Process Puts Spotlight on Carbon Black

Here's a new way to make carbon black which, if the claims being made for it can be substantiated, could revolutionize the industry. And it uses cheap waste gas.

Ever-increasing demands for natural gas as a consumer fuel in the northeastern U. S. are making it very difficult for carbon black manufacturers to find large gas fields that aren't already sewed up by the pipeline companies. This means that new long-term gas contracts—essential to both the channel and furnace carbon black processes—are extremely hard to come by.

Now R. P. Lynn, president of Lynn Carbon Black Co., San Angelo, Tex., has announced a new carbon black process which, because it's designed for use in small, very inexpensive plants, can use hitherto wasted flare gas from oil wells instead of natural gas. At the same time, much higher yields of black are claimed than in any of the older processes and the air-pollution problem is virtually eliminated.

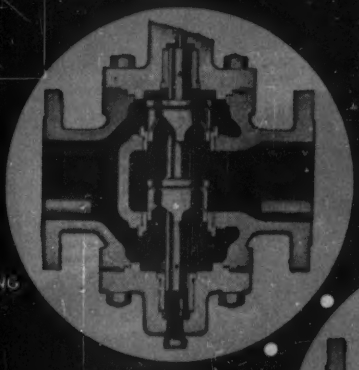
Lynn claims his new method will recover as much as 17 of the 35 lb. of carbon black that's theoretically available per 1,000 cu. ft. of most natural gas. This compares to about 2.2 lb. by the channel method and 10 lb. by the best furnace plants.

▶**First Plant**—The only Lynn plant built to date is a full-scale demonstration unit in the Pulliam oil field, five miles west of San Angelo. Gas is being obtained at 1 c. per Mcf. from Sun Oil Co. which also supplied gas for the earlier experimental operations at the Jameson oil field, Coke County, Tex.

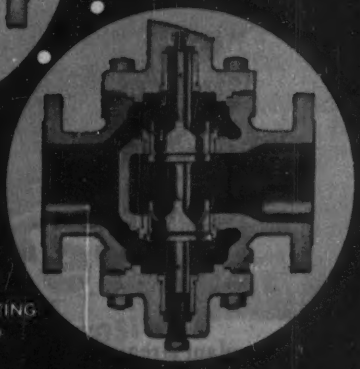
The main purpose of this installation is to provide oil and gas industry engineers with a typical plant which they can operate themselves. Built at a cost of less than $25,000, the unit can process as much as 625 Mcf. of gas per hr., according to Lynn. A typical channel plant processing the same amount of gas costs almost $2.5 million to erect.

Another advantage that makes the process so attractive for flare gas recovery is the fact that one man can maintain and oversee the operations

QUICK SHIFT

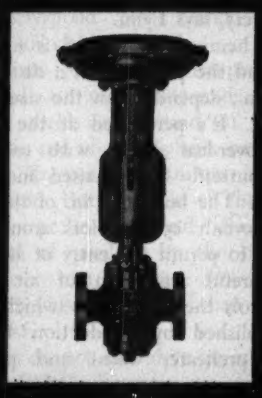


DIRECT ACTING
air to close



REVERSE ACTING
air to open

for easy field reversal of valve action



You can reverse the control action of the Honeywell Series 700 Valve by inverting the valve body and disc, and turning the travel indicator plate to its reverse side. It can be done in the field easily and quickly, without extra parts or complex adjustments.

The Honeywell Series 700 wide band proportional control valve comes in a full range of styles and sizes has *all* the features you look for in a fine valve. Write today for your copy of Bulletin 700-2.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1904 Windrim Avenue, Philadelphia 44, Pa.

MINNEAPOLIS

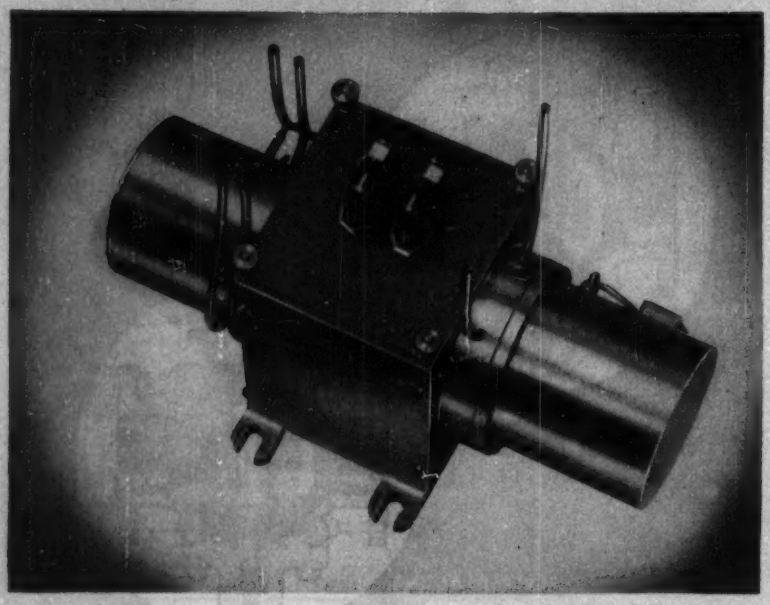
Honeywell

VALVE PRODUCT

First in Controls

WATCHDOG for WASTE

in Ethylene manufacture or use



In any plant stream containing ethylene, the Baird Associates infrared-type Plant Stream Analyzer is the simplest, most reliable, most sensitive, and most economical means of continuously measuring the ethylene concentration.

Through savings made possible by instant knowledge of plant stream composition, the total investment in the installation — from $4000 to $5000 — may be recovered in as little as one month of plant operation.

This *plant-tested* instrument is not limited to ethylene, but may be sensitized for any of a wide variety of plant stream components.

Write today for one of our sales engineers to call and discuss your specific analytical problems with you.

PROCESS CONTROLS

a division of Baird Associates, Inc.

11 UNIVERSITY ROAD CAMBRIDGE 38, MASSACHUSETTS

of any number of units within a 100-mile radius. The process is completely automatic once the air rate is set. Also, any size plant can be built at a nominal cost to fit the individual needs of any oil field and a small plant can be moved to a new location in just a few hours.

▶ **Secret of Success**—Controlled preheating and combustion—at essentially atmospheric pressure—plus rapid removal of product from the combustion zone give the Lynn process its decided advantage in yield over the older methods. Either wet gas or process-stripped gas from which the natural gasoline has been removed can be used, with wet gas giving about a 20 percent greater yield.

Essential to the system is a spherical preheating vessel, either steel or cast-iron, which can range in size from the 14 in. diameter used in the demonstration unit upward, depending on the volume of gas processed.

Flare gas from oil wells is cleaned, if necessary, and enters the preheater through two pressure regulators which reduce the pressure almost to atmospheric. The preheater also acts as a surge vessel to maintain atmospheric pressure.

Gas leaves through holes drilled in a staggered pattern in the top half of the preheater. These holes are tapered from $\frac{1}{16}$ in. on the inside to $\frac{1}{4}$ in. at the top and allow the gas to leave the preheater without any increase in pressure, a condition that's conducive to maximum carbon black recovery, says Lynn.

A hemispherical hood is mounted around the preheater at a distance of 3-6 in., depending on the size of the plant. It's perforated at the top in a clover-leaf design with each leaf (or butterfly baffle) raised and shortened. The bottom 6 in. of the hood has evenly spaced slots around the edge to permit the entry of air.

Careful regulation of air intake controls the preheating (which is accomplished by conduction through the preheater walls) and prevents excessive temperatures which would reduce yield. Only enough combustion takes place under the hood to maintain constant preheating.

Completely surrounding the preheater and hood is a metal drum which tapers to about 20 in. at the top. The actual combustion and

formation of carbon black takes place in this drum—above the preheating section—at 1,000-2,000 deg. F. All the carbon black formed is very rapidly removed by a blower and transferred into a cyclone separator and thence into a large accumulator—6 ft. in diameter and 50 ft. long (see top cut, center).

The action of the blower is to pull the carbon black out of the combustion area as it's made and blow it into the cyclone. This reduces the velocity and drops some of the black into the conveyor immediately below the cyclone. This black is then carried through the accumulator and into the small agitator tank (see top cut, right).

The rest of the black is processed in the cyclone and then enters the accumulator. Immediately inside is an electrode screen of heavy copper wire—insulated from the main vessel—which charges the carbon black particles. The tank itself acts as the opposite pole of a magnet, attracting the black and holding it on the sides of the tank until a slowly-revolving scraper takes it down to the conveyor and into the agitator. From there product can go either to storage or to a pelletizer.

The blower, scraper and conveyor are run by variable-speed electric motors—800 to 2,400 Rpm. Air intake regulators are actuated by the speed of the blower motor, preventing destruction of the black by prolonged combustion.

▶ **High-Quality Black**—Early runs in the demonstration plant have shown that no quality need be sacrificed to attain high yields. Even when making extremely good "color blacks," Lynn claims his yields are high.

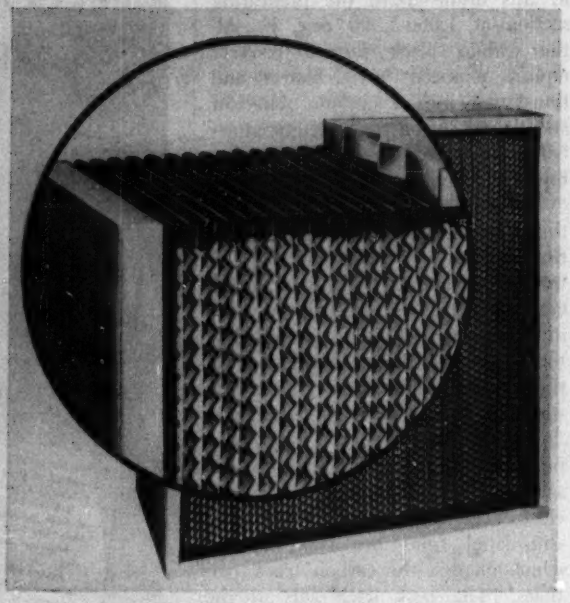
Because of the high temperatures required to make top-grade color blacks, yields are bound to suffer. Furnace and channel plants cut back to ½-¾ lb. per Mcf. of gas in this operation. But, because of the controlled preheating and the fast removal of product by the blower-cyclone system, the new process has reached yields of more than 5 lb. per Mcf.

"We do not intend to go into the carbon black business on a large scale," says Lynn. "We intend to franchise some company in the U. S. for the exclusive use of our process. They, in turn, can license anyone else they desire. We also intend to license foreign companies in the same manner, all on a royalty basis."

NERCO-NIRO
Spray Dryers*
Wheel of Progress
For Chemical Processors
The Nerco-Niro Spray Dryer atomizer wheel symbolizes progress . . . and profits for processors of chemicals.
Use the finest modern equipment to assure a finer product. Nerco-Niro engineers can show you how to:
Maintain control of uniformity in particle size.
Assure effective control of bulk density and in handling liquids of high viscosity and concentration.
Get a higher percentage of solids recovery.
Nerco-Niro Spray Dryers are easy to operate, require very little maintenance and consume little power.
Write now for further information.
NERCO NIRO
NICHOLS Engineering & Research Corp.
NERCO-NIRO SPRAY DRYER DIV.
* Pat.
ROOM 3106 70 Pine St., New York 5, N. Y.
Indianapolis Pasadena Montreal

Ceilcrete
a stonelike corrosion proof trowelled on surface
✓ ACID PROOF
✓ ALKALI PROOF
✓ SOLVENT PROOF
TOPPING for FLOORS • WALLS
ACID HOLDING TANKS • WASTE
DISPOSAL SYSTEMS, ETC.
THE CEILCOTE COMPANY
4832 Ridge Road, Cleveland 9, Ohio
Send for technical data on its application, corrosion resistance properties
Ceilcrete

TAPING of filter joints prevents even the tiniest leak.



PLEATED construction offers large area for low resistance.

Progress in Air Filtration

Industry never had it so clean before, as the war-developed, high-efficiency Absolute filter gets off on a solid commercial footing.

Only two years have passed since Cambridge Corp. of Syracuse, N. Y., began commercial production of its so-called "Absolute" air filter.

In that short space of time more than 10,000 individual filter units have been sold. Over a dozen pharmaceutical firms have installed Cambridge air filtering systems; capacity in that industry alone is now some 250,000 cfm. Other representative installations are listed in the table on this page.

The Absolute filter uses as its medium a paper made from specially treated pulp to which fine asbestos fibers have been added during manufacture. Developed during World War II by Arthur D. Little, Inc., this paper was first used in gas masks by the Chemical Corps, later by the Atomic Energy Commission. In 1950 it was declassified and made available to industry.

▶ Goodbye Dust—High efficiency is the oustanding characteristic of the Cambridge filter. Based on 0.3-micron particles, its efficiency is said to be 99.95 percent or better. In other words, out of every million sub-micron-size particles in the air stream entering the filter, less than 500 pass through.

A typical cubic inch of air contains as many as 20,000 particles of various kinds. Conventional air-cleaning devices may cut this number down to 3,000-12,000 particles. But the Absolute filter, by actual test, lets through fewer than 10 particles. This efficiency even improves with use.

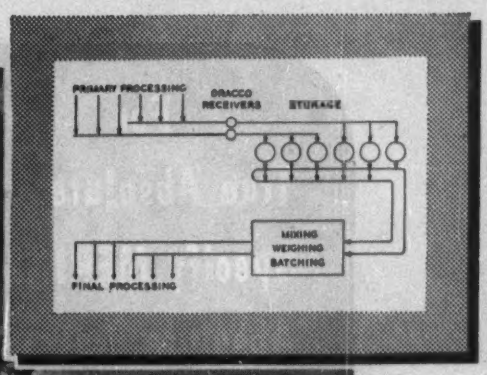
AEC's use of this filter is chiefly to clean up exhaust air. Even the tiniest particles of dust could carry radioactivity into the atmosphere, if not removed from the air before it is exhausted.

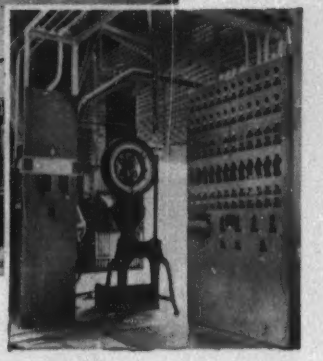
▶ Commercial Uses—Most industrial applications use the Absolute filter for cleaning the ventilating air supplied to a special building or room, or for filtering compressed air supplied to a particular process.

The drug and pharmaceutical industry has been one of the leaders in putting the Absolute filter to use. One of the latest installations is at Bristol Laboratories. Tests at Bristol showed that a single filter (passing 30-35 cfm. with a pressure drop of 0.8-1.0 in. water) had an average leakage of 0.0031 percent when filtering air with up to 1,730,000 organisms (*serratia*

Representative Absolute Filter Installations

Industry	Company and Location	Cfm.	Duty
Pharmaceutical	Bristol Laboratories, Syracuse, N. Y.	40,000	Sterile air supply to filling room
Pharmaceutical	R. K. Laros Co., Bethlehem, Pa.	6,000	Sterile air for Dextran production
Pharmaceutical	Chas. Pfizer & Co., Brooklyn, N. Y.	18,000	Air to sterile areas
Pharmaceutical	Undisclosed	4,000	Morphine dust removal
Pharmaceutical	Heyden Chemical Co., Princeton, N. J.	4,000	Grinding room operation
Plastics	Boonton Molding Co., Boonton, N. J.	30,000	Color quality control for plastic dinnerware
Aluminum	Aluminum Co. of America, Massena, N. Y.	5,000	Clean air for control laboratory
Film	Undisclosed	9,000	Movie film drying tunnel
Fermentation	Publicker Industries, Philadelphia, Pa.	18,000	Process air for fermentation
Atomic energy	Argonne National Laboratories, Chicago, Ill.	Several systems totaling over 400,000	Radioactive exhaust systems
Electrical	Undisclosed	4,000	Used in lamp development laboratory





Materials flow diagram shows how Dracco "Airstream" system moves materials from primary to final processing with storage en route in silos (above). One man operates system from control panel (right).

Synthetic Fiber Plant Reduces Handling Labor 96%

One man instead of thirty!

That is the remarkable 96% reduction in materials handling labor produced by an automatic Dracco "Airstream" Conveyor at a large synthetic fiber plant. The Dracco system, effectively integrated into the chemical production process, has also improved product quality and uniformity.

This "Airstream" installation moves materials at rates up to 15 tons per hour from primary processing to final processing with intermediate storage en route. Two types of powdered plastic materials are accurately mixed, weighed and batched, assuring less product spoilage and better, more uniform quality.

One man operates the entire system from a single nerve-center control panel. From this point he can maintain precise control over the 3000-foot, dual-line "Airstream" system. Former manual and mechanical handling methods for the same job required thirty men per shift.

This new concept of "Airstream" conveying integrated with the production process is establishing similar records for economy in many plants. To learn how your plant can profit from this modern Dracco technique, write or call Dracco today.

AN "AIRSTREAM" CONVEYOR IN YOUR PLANT MEANS:

Less labor cost with automatic handling

•

Lower material cost thru bulk purchasing

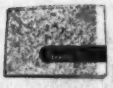
•

Flexible, space-saving, dust-free handling

•

Low maintenance . . . greater safety

DRACCO CORPORATION
4040 East 116th Street • Cleveland 5, Ohio



Technical information on "Bulk Materials Handling with Airstream Conveyors" is presented in Dracco Bulletin 529. Write for your copy today.

DRACCO *Performance Proved*

Airstream **CONVEYORS • DUST CONTROL EQUIPMENT**

Here are important, helpful features, you'll find in Meriam Absolute Pressure Gauges:

- Two types available — U-Type and Direct Reading Well Type.
- They accurately measure absolute pressure from one millimeter to 100" mercury.
- Sealed-end, mercury filled indicating tubes for U-Type are easily replaced in the field.
- Indicating tubes completely evacuated and filled with dry, triple-distilled air-free mercury.
- Self compensating for changes in barometric pressure.
- Shipped ready for immediate service.

If you have a measurement problem, write us today for a share of our more than 40 years' experience in providing primary standards for measurement of flow or pressure of liquids and gases.

THE MERIAM INSTRUMENT CO.
10916 Madison Avenue • Cleveland 2, Ohio
WESTERN DIVISION: 4760 E. OLYMPIC BLVD., LOS ANGELES 22, CALIF.
IN CANADA: PEACOCK BROS., LTD., MONTREAL

MERIAM ★ Instruments
ESTABLISHED 1911
MANOMETERS, METERS AND GAUGES FOR THE ACCURATE MEASUREMENT OF PRESSURES, VACUUMS AND FLOWS OF LIQUIDS AND GASES

marcescens) per cu. ft. Two layers of the best type of glass-fiber filter had an average leakage three times as great and a pressure drop almost twice as great.

▶ **Filter Construction**—To obtain the most filtering area in a small cross-section, the filter paper is formed into a closely pleated construction, with corrugated cardboard separators. Individual units can be had from 8 to 24 in. square, using plywood frames. The latter size contains 250 sq. ft. of filtering surface, has a rated capacity of 1,000 cfm. Annual operating cost per 1,000 cfm. is in the range of $55 to $65, based on filter life of 18 months.

Assembly of filter banks is quite simple. The units are merely set in place like building blocks; sealing tape is then applied to the joints. The installation should preferably be on the pressure side of the fan to insure that any leakage in the ductwork be outward.

Tightness is the primary concern in any installation. A leak around the filter unit frame will obviously nullify the effectiveness of the filter.

Preliminary tests indicate that the filter paper stands up well against moderate concentrations of ammonia, caustic soda, HCl or HF fumes. The filter failed or showed a drop in efficiency with fuming H_2SO_4, strong HF and strong nitric acid.

Recommended temperature limit is 220 deg. F.; the filters deteriorate under prolonged exposure to 250 deg. or above. However, a new high-temperature filter is under development, similar in design and performance to the present one. It is based on an asbestos-bearing glass paper, pleated in the same way, inserted in a frame of metal instead of plywood and using corrugated aluminum separators instead of cardboard separators.

Solid Formaldehyde Made As Water-Free Polymer

Heyden Chemical Corp. is now producing a new solid form of formaldehyde that contains less than one-tenth of 1 percent of water. It is being made commercially by a special process.

The new solid formaldehyde, called Superfyde by Heyden, has special advantages for processes in the plastics,

textile, rubber and other industries which call for formaldehyde, but where the presence of water inhibits or prevents reaction.

Somewhat similar to paraformaldehyde in chemical structure, the new product has a higher molecular weight and a higher melting point. According to Heyden, it can be used where paraformaldehyde and other types of formaldehyde are not well adapted. It is of special interest as a source of dry formaldehyde in the manufacture of chemical intermediates and resins.

Refractories Will Come From New Wisconsin Plant

Refractory specialties will be manufactured in a new plant to be built at Janesville, Wis., for the Industrial Minerals Division of International Minerals & Chemical Corp. The plant will be able to turn out 75,000 tons a year of refractories.

Chief product will be a granular refractory for air application in the patching of metal melting furnaces.

This is the fourth plant for producing such refractory specialties to be erected by the Eastern Clay Products Department of International's Industrial Minerals Division. It is located to reduce freight rates and speed shipping.

Cheaper Uranium Recovery Goal of Cyanamid Research

Better ways to recover uranium from its ores are being explored by American Cyanamid Co. in a new Winchester, Mass., laboratory that it operates for the Raw Materials Division of the Atomic Energy Commission.

Effective and economical methods for getting uranium from low-grade ores will be developed in the laboratory, which is equipped to investigate all phases of mineral dressing.

Tests utilizing all accepted methods for the concentration and chemical treatment of ores can be carried out at the Winchester laboratory. New techniques and equipment specially designed for the extraction of uranium are a feature of the installation.

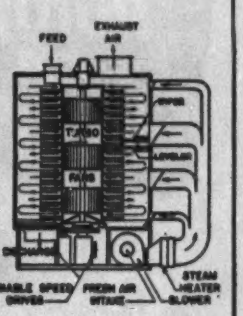
Ore samples from uranium fields throughout the world are sent to Winchester by the AEC. Sometimes very small quantities are involved, while at other times several carloads may arrive.

Basically, the operations of the lab-

the CONTINUOUS Turbo-Dryer® VERTICAL, TRANSFER TYPE

for GRANULES • BEADS • POWDERS CRYSTALS • PASTES • SLUDGES • SLURRIES

DRYING
COOLING
SUBLIMATION
OXIDATION



combines
gentle handling
uniform drying
dustless operation
high efficiency

with
low power
reduced space
low maintenance
low dust losses

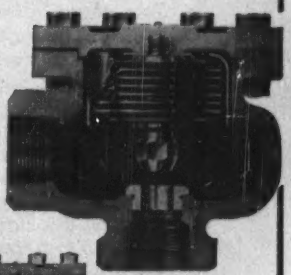
Available in packaged unit for pilot plant and small production. Field erected units up to 25,000 lb. evaporation per hour.

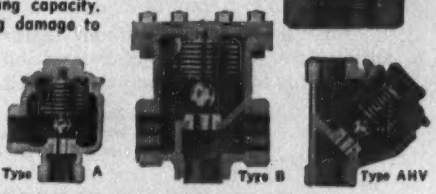
TURBO DRYER

WYSSMONT COMPANY
DRYING ENGINEERS
42-05C 27th Street (Bridge Plaza South) • Long Island City 1, N. Y.
Representatives in Principal Cities

LEADING PROCESSOR
SHORTENS OPERATION
from 65 to 45 Min.
with Nicholson Steam Traps

Records of a recent installation of Nicholson steam traps, by a large processor, show they cut kettle time 30%; e.g., one operation was shortened from 65 to 45 min. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity. Also record low for steam waste; and maximum air-venting capacity. Widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters.



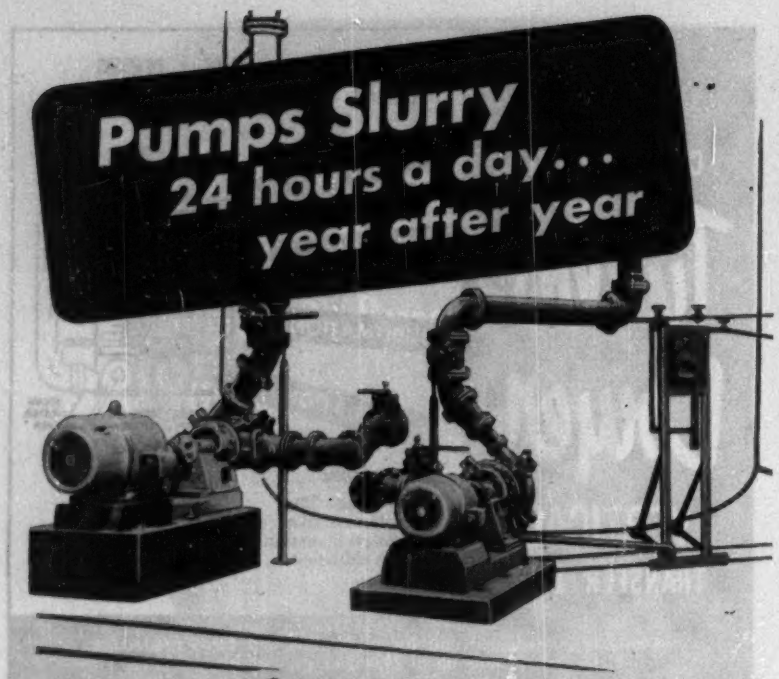


5 TYPES FOR EVERY PURPOSE—SIZE ¼" to 2"; pressures to 250 lbs. BULLETIN 152.

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. BULLETIN 650

206 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.
TRAPS · VALVES · FLOATS



● MORRIS TYPE R SLURRY PUMP at the left is on continuous 24-hr. duty delivering 1000 GPM of a 170° lime slurry at 100' head. Fifty-HP motor operates at 1180 RPM. Intermittent-duty pump at right delivers 200 GPM at 50' head with 7½-HP motor turning at 880 RPM.

In slurry-handling operations, "long-term service" is a meaningless claim unless the pump will work day-in and day-out with a minimum of maintenance time, trouble and expense

Morris Type R Slurry Pumps—with an established reputation for longer life—also incorporate in their design exclusive features which result in easier installation . . . fewer interruptions to service...less overhaul...fewer replacements.

To provide uninterrupted service . . .

The gland is under suction pressure only. This reduces leakage and dilution . . . keeps harsh abrasives out of the stuffing box . . . practically eliminates packing troubles.

There are no internal studs or bolts. Caustic and corrosive solutions cannot seep past threads and cause maintenance headaches.

To make installation and dismantling easy . . .

Shell is interchangeable for right or left hand rotation. Suction and discharge nozzles can be rotated around the axis of the pump to a total of 72 different locations.

Impeller removed without disturbing the piping. You simply loosen 4 *outside* clamping bolts and pull off the end cover. This feature alone saves considerable time and labor.

● *Free Service.* Morris Engineers will be glad to recommend the pump best suited to your needs for size, capacity, etc. Send necessary data today . . . include request for Bulletin 181.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

MORRIS *Centrifugal Pumps*

oratory parallel those of a commercial metallurgical processing mill. Experience gained is passed along to producing units, which put the processes to work at sites near the deposits of uranium-bearing ores.

Starting with ore, the Winchester laboratory carries it through to the end product, which is a uranium concentrate of acceptable grade and composition. In addition, field parties of laboratory engineers are frequently sent to plants in the United States and abroad to give technical help on processes.

A recent example of this work was the erection of a small producing unit and analytical laboratory at Grand Junction, Colo., which is now staffed by Winchester personnel. The whole operation is the result of a process started when MIT was operating the original mineral dressing laboratory at Watertown, Mass., before American Cyanamid took over in 1950 and before the new Winchester installation opened. If the Grand Junction undertaking proves that the process works on a production scale, the recovery of uranium from certain ores will be improved and costs cut considerably.

American Cyanamid formed in 1950 its Atomic Energy Division, which is directly responsible to the vice president of research and development. The Winchester operation is supervised by the director of the Mineral Dressing Division of Cyanamid's Stamford, Conn., research laboratories, with which it is closely coordinated.

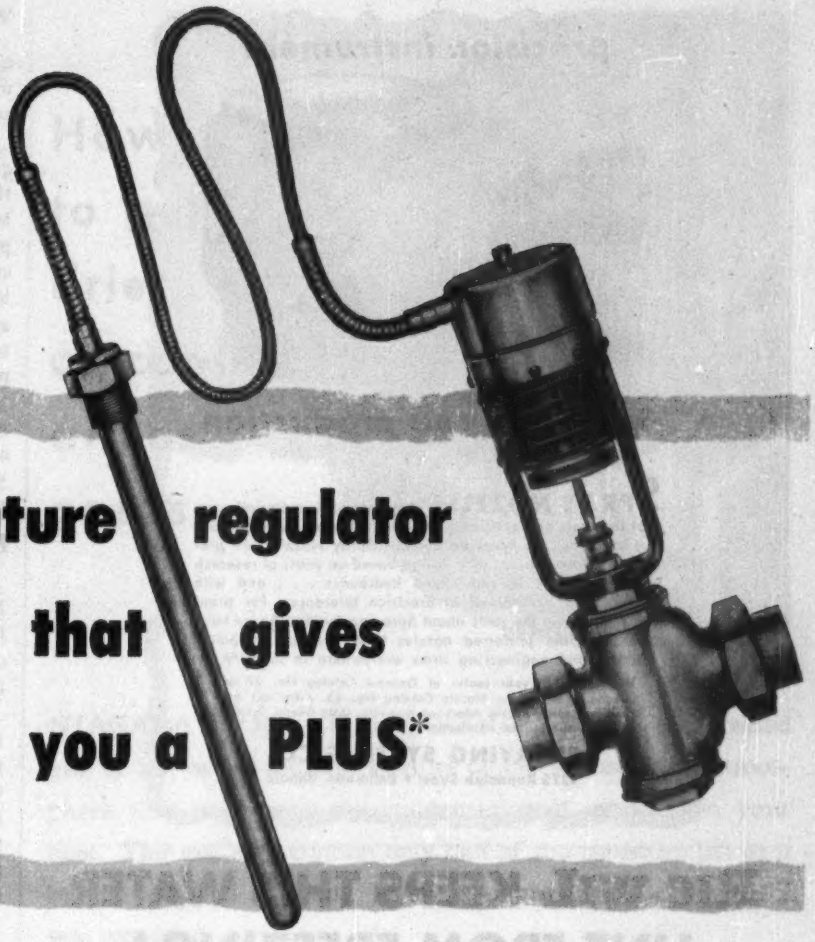
At present, the Winchester staff comprises about 80 persons, of whom half are technical people. Most have been several years with the unit, and have been specially trained in mineral dressing at Cyanamid's Stamford research laboratories. It's anticipated that the staff at Winchester will probably increase in the future to more than 100.

Gas Reformer Saves Compressor Horsepower

Rapidly nearing completion is the new ammonia plant of Shell Chemical Corp. at Ventura, Calif., with towers already on their foundations and many other structures partly finished. M. W. Kellogg Co. is handling the construction job.

The new plant, slated for comple-

SYLPHON SAFETY TYPE
TEMPERATURE REGULATOR
No. 926



The temperature regulator that gives you a PLUS*

**Has "Fail Safe" feature—protects against accidental overheating*

● This Sylphon Safety Type Regulator No. 926 not only gives you constant, positive temperature control—but also protects against accidental overheating. The operation is simple and safe. If the connecting tubing or bulb should be accidentally injured, causing loss of the thermostatic charge, the Regulator *fails safe;* the control valve closes automatically. No overheating and consequent damage to products in process. Savings in manpower, manhours and fuel.

And for versatility, No. 926 scores high! It can be furnished with a reverse-acting valve for cooling control; the control valve will *open* if the thermostatic charge should be accidentally lost. Also available with fin type bulb for controlling temperature of air and gases.

Sylphon Safety Type Regulator No. 926 is sturdily built to give years of trouble-free service. Neat and compact. Has many uses. For example, for control of chemical heating tanks, cooling of mixing tank reactions, engine and compressor cooling, heating of water for showers, etc. Ideal as standard equipment. For the complete story about No. 926, write for Bulletin NC-D.

FS
FIRST WITH BELLOWS

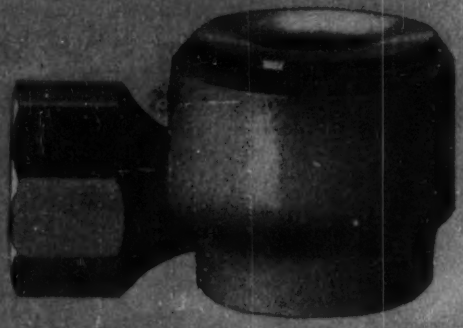
Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 1, TENN.

Canadian Representatives, Darling Brothers, Montreal

precision instrument



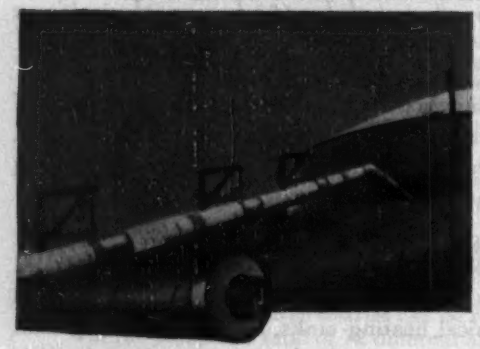
for improved production

SPRAY NOZZLES alone can often materially control the costs and efficiency of a process or operation involving spraying. All Spraying Systems Spray Nozzles are precision instruments . . . with design based on years of research and experience in specialized hydraulics . . . and with manufacture maintained at precision tolerances. For proof let us give you the facts about Spraying Systems Spray Nozzles . . . the preferred nozzles today among equipment builders and engineering firms everywhere in industry.

WRITE FOR your copies of General Catalog No. 22 and Pneumatic Atomizing Nozzle Catalog No. 23. America's most complete spray nozzle reference manuals. Data Sheets supplied covering specialized applications.

SPRAYING SYSTEMS CO.
3275 Randolph Street • Bellwood, Illinois

RIC-WIL KEEPS THIS WATER LINE FROM FREEZING!



PROBLEM: City officials of Ishpeming, Michigan were concerned with providing the most economical method of connecting an elevated water storage tank at the top of a hill into the distribution system, with the line protected from freezing. Due to the ledge rock terrain, both an underground pipe line and rock tunnel were rejected as too costly and impractical.

SOLUTION: Working closely with Ric-wiL's engineering department, the consulting engineers devised an overhead Ric-wiL supply line, properly insulated to keep the line from freezing, which could be constructed much more cheaply than any of the alternate methods.

The 12" steel water line is coated on the inside with Ricwilite phenolic resin for corrosion-resistance and covered with 3" thick Fiberglas insulation, with a ¾" steam tracer provided for stand-by use, if required. The entire prefabricated system is housed inside 21" diameter RIC-WIL HEL-COR Conduit, amply protected from the elements.

Consulting Engineer:
Drury, McNamee & Porter
Ann Arbor, Mich.

Contractor:
L. W. Brumm
Marquette, Mich.

Ric-wiL PREFABRICATED INSULATED PIPING — UNDERGROUND OR OVERHEAD

THE RIC-WIL COMPANY • CLEVELAND, O.

tion this summer, possesses many unique features that will result in both economy and efficiency of operation.

One in particular is the synthesis gas reformer, which operates at higher than customary pressures. Since natural gas is usually available under pressure the method conserves this energy, thus reducing the compressor load required later in the ammonia synthesis stage. Kellogg estimates a saving of 25 to 35 percent in compressor horsepower.

Design capacity of Shell Chemical's new Ventura plant is over 150 tons of anhydrous ammonia daily.

Catalytic Reformer Part of Petrochemical Expansion

A $14 million expansion at the Marcus Hook, Pa., refinery of Sinclair Refining Co. will increase production of strategically important petrochemicals.

As part of the expansion, a catalytic reforming unit with a charging capacity of 16,000 bbl. per day will be erected by C. F. Braun & Co. When completed in the summer of 1954 this unit will produce the higher octane gasolines to be required by future high-compression engines.

The catalytic reformer, which rearranges the molecular structure of gasoline, will employ a new processing method and a platinum catalyst recently developed by Sinclair Research Laboratories, Inc., and Baker & Co., Inc., platinum specialists.

Petrochemical facilities at Marcus Hook will be expanded to produce aromatic hydrocarbons such as toluene, used in the manufacture of aviation gasoline and explosives, and xylenes, raw materials for many plastics.

Sinclair's Marcus Hook refinery currently has a rated capacity of 105,000 bbl. per day.

New Shell Process Rids Feedstocks of Sulfur

Advantages of a new hydrodesulfurization process of Shell Development Co. are that feedstocks don't have to be vaporized, heavier charge stocks can be desulfurized, and longer periods on stream can be achieved. The Lummus Co. is currently building one of these hydrodesulfurization units for Shell at Stanlow, England.

Lummus has been authorized to

offer Shell's new hydrodesulfurization process, and possesses information on yields, investment and manufacturing costs.

New Canadian Plant to Make Isopropanol and Acetone

To meet demands of Canada's growing industry, Shell Oil Co. of Canada, Ltd., recently put on stream at Montreal East a new chemical plant with an annual capacity of 20 million pounds of isopropyl alcohol and acetone.

Because of its wide flexibility the plant can vary the relative proportions of isopropyl alcohol and acetone produced. Shell won't say how much of each it makes at any one time, explaining that this varies with demand.

The isopropyl alcohol is the first to be manufactured in Canada, and the acetone is the first to be made in Canada from petroleum raw materials.

Feedstock for the plant comes from Shell's Montreal East refinery.

Special features make possible operation at temperatures as low as −20 deg. F. Parts of the plant where the temperature is critical are indoors. Bases of distillation columns, for example, are inclosed, while the tops of the columns are not. There is extensive steam tracing throughout the plant to protect lines. The new Montreal East plant embodies the latest refinements in Shell's isopropyl alcohol process.

Layout, mechanical design and construction were by C. F. Braun of Alhambra, Calif.

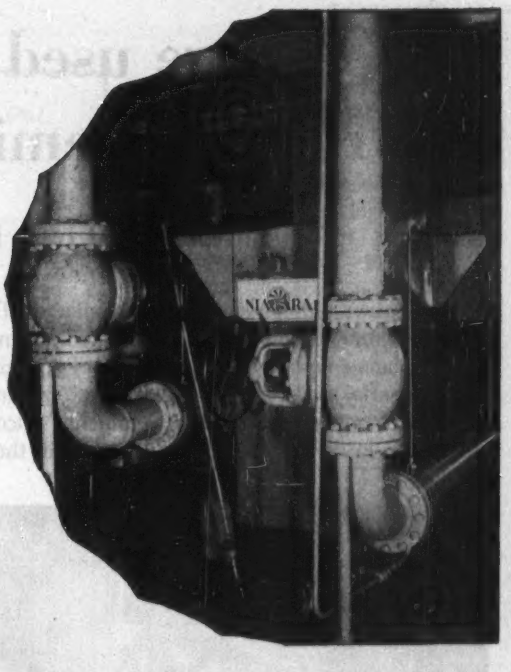
Sulfur From Wyoming Gas to Make Acid for Triple Super

Brimstone will be produced from Wyoming natural gas in a joint operation of Gates Bros., Inc., and Jefferson Lake Sulphur Co. of New Orleans. Both firms will participate in erection of a plant to extract the sulfur from the natural gas.

The only substantial recovery of sulfur from natural gas in Wyoming is in the Big Horn Basin area around Worland. Charles Gates, president of Gates Bros. of Wendell, Idaho, says that a substantial amount of sulfur can be recovered from the gas.

Sulfur is needed by the Idaho concern for conversion into sulfuric acid. The acid, in turn, will be used in the production of triple superphosphate fertilizer.

How to get drier or cooler air or gases . . .



NIAGARA AERO AFTER COOLER cools a compressed gas, or air, below the temperature of the surrounding atmosphere, thus preventing the condensation of moisture in your lines. The gas will contain only half of the moisture left in it by conventional methods. Even drier gas can be produced if you require it.

In working with controlled atmospheres of inert gases to prevent undesired reactions, this dryness of the gas at low cost is a great advantage. The cost of the Niagara method is low because it uses evaporative cooling, saving 95% of the cost of cooling water (and its piping and pumping). This direct saving of cost pays for the Niagara cooler in less than two years.

If you use compressed air to operate tools or pneumatic equipment you save much in water and oil damage to tools and equipment, and in water damage to materials by using the Niagara Aero After Cooler.

Write for a bulletin, or ask nearest Niagara Field Engineer if you have a problem involving the industrial use of air.

NIAGARA BLOWER COMPANY

Over 35 Years' Service in Industrial Air Engineering

Dept. CE, 405 Lexington Ave. New York 17, N. Y.

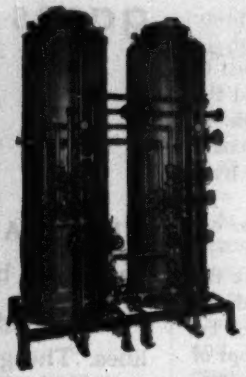
Experienced Field Engineers in Principal Cities of U. S. and Canada

ADVERTISEMENT ADVERTISEMENT ADVERTISEMENT

ionXchange used in purification of Organic Chemicals

Removal of acid from Ethylene Glycol accomplished by Illco-Way Unit

A southwestern chemical plant contacted Illinois Water Treatment Company and requested information on ionXchange equipment for removal of acid present as an impurity in Ethylene Glycol. This presented a new basic organic purification problem. Illco-Way technicians knew that organic acid present in the solution could be removed by anion exchange. What was not known was whether the organic solution, plus its impurities, would have an aggressive effect on this material, and whether the treated effluent would remain constant in purity throughout a useful operating cycle. Since there was no background on the subject, the laboratory proceeded to prepare test columns containing various types of anion exchangers to determine the stability under conditions that would be met in plant operation.



Organic purification problem, solved in Illco-Way laboratory (left), resulted in development of ionXchange unit shown at right—installed in chemical plant for removal of acids from organic solutions. Illco-Way is equipped to carry such problems "from pilot plant to process stage."

The life of various exchangers was studied with Ethylene Glycol containing Ethylene Oxide. Particular importance was placed on determining resin characteristics for the removal of Sulphuric Acid (present as an impurity) in the presence of other impurities. The laboratory was also interested to learn of the economical life of the exchange material in the presence of an Ethylene Glycol solution containing Ethylene Oxide.

The feed solution to the anion reactor had the following analysis: 13% Ethylene Glycol, 85% Water, 1.5% Diethylene Glycol, 0.25% Triethylene Glycol, 0.1% Ethylene Oxide, 0.15% Sulphuric Acid. At the end of 100 cycles, some capacity reduction of the exchange material was noted; this, however, was anticipated. During the test period, the length of the cycle for purification as well as the quantity of caustic soda to be used for regeneration was determined. Tests were conducted at 100° F. so as to duplicate plant conditions. At the end of 211 cycles, capacity tests of the exchangers showed a loss of 11%. Quality of the effluent, however, remained stable. The results of the tests indicated the process would be successful both from an operating and economic standpoint.

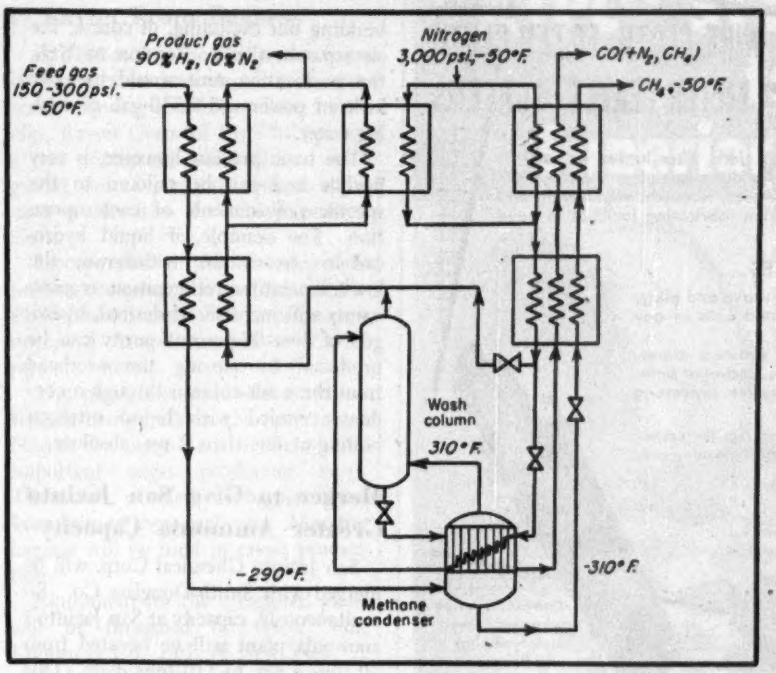
With laboratory and engineering information obtained during pilot plant operation, equipment was designed and a special anion exchange reactor was built to meet the requirements of industrial application. This method has now been accepted as standard in the chemical industry.

Other examples of the application of ionXchange for purification of organic solution developed by Illco-Way research: Purification of Glycerol (by cation and anion exchange) and purification of Chromic Acid (by cation exchange). Illco-Way, with its wide experience in the industrial field and long background of ionXchange pioneering, is uniquely equipped to work out the development of a problem *from pilot plant to actual process stage.* For complete literature and details of equipment for specific applications, write to:

ILLINOIS WATER TREATMENT CO., 844-7 Cedar Street, Rockford, Illinois. New York Office: 141 East 44th Street, New York 17. Canadian Distributor: Pumps & Softeners Ltd., London, Ontario.

ILLCO-WAY

ionXchange



Scrub With Liquid Nitrogen

New low-temperature purification process is well suited for ammonia plants based on refinery hydrogen or partial oxidation of natural gas.

Synthesis gas for production of ammonia can be freed of its carbon monoxide and methane contents by washing with liquid nitrogen, according to a recent report by Blaw-Knox engineers.

Speaking at a meeting of the Tulsa section of AIChE, Jack Bardin and Don Beery, of Blaw-Knox's Chemical Plants Div., Pittsburgh, reviewed the application of nitrogen washing not only for the production of ammonia synthesis gas but also for the production of 98-percent or better hydrogen streams. A number of installations are reported to be under construction now in the United States.

Current interest in nitrogen wash systems is apparently due to greater use of partial oxidation of natural gas, as opposed to natural gas reforming. Partial oxidation plants have by-product nitrogen available from their air separation units. Use of nitrogen washing is a natural for such plants.

Increasing direct use of hydrogen-rich refinery gases is another factor. The methane removal problem with these gases may be quite serious, and the advantages of nitrogen washing are even more evident.

The process, developed by the German Linde Co., is used extensively in Europe as part of coke-oven gas separation plants.

▶**Methane Problem**—Conventional methods for purification of ammonia synthesis gas are designed to get rid of residual carbon monoxide as completely as possible. This is done by scrubbing with refrigerated copper ammonium formate solution; alternately, the CO can be catalytically converted to methane. This gets rid of CO all right but leaves methane in the gas.

Although methane doesn't poison the synthesis catalyst like carbon monoxide does, it must be removed from the conversion cycle; otherwise it builds up and reduces the effective partial pressure of the hydrogen and nitrogen. Some of the methane dissolves in the liquid NH_3 product; the remainder must be purged from the system, resulting in losses of both ammonia and synthesis gas.

Synthesis gas from a liquid nitrogen wash plant, however, contains very little inerts or catalyst poisoners.

▶**How It Works**—The feed gas and nitrogen are first precooled by heat exchange with the leaving gas streams and further cooled by conventional refrigeration down to −50 deg. F. If the entire refrigeration load were thrown on the nitrogen cycle the total power would be much more than the staged refrigeration system used. In addition, the feed gas is dried by adsorption to a −100-deg. F. dewpoint.

The feed gas entering the low-temperature unit (*see flowsheet*) is cooled to −290 deg. F. by the product gas stream. Most of its methane content is then condensed by heat exchange against the colder (−310 deg. F.) evaporating CO effluent from the bottom of the wash column. The rest of the feed gas passes upward through the column against the liquid nitrogen wash stream; CO and other compounds, including any remaining CH_4, are removed from it by the scrubbing action.

Both cold waste streams leaving the system are warmed against incoming high-pressure nitrogen. The liquid methane is evaporated to recover as much refrigeration as possible.

The incoming nitrogen stream is split. One part is throttled to system pressure, goes through a coil in the methane condenser, where it is liquefied, then fed to the top of the wash column. The other part is throttled and mixed with the product gas from the wash column; its function is to balance the heat duties in the unit.

Additional nitrogen can be added to the product gas, outside the low-temperature unit, in order to get the right hydrogen:nitrogen ratio for ammonia synthesis.

▶**Process Economics**—A typical feed gas, made by partial oxidation of natural gas followed by shift conversion and CO_2 removal, would contain 96 percent H_2, 3 percent CO and 1 percent CH_4. Based on 100 cu. ft. of feed gas, 36.2 cu. ft. of nitrogen would be needed, and 125.6 cu. ft. of ammonia synthesis gas would be obtained. Sixty percent of the nitrogen would be compressed to 3,000 psi., the balance to 300 psi.

For a 200-ton-per-day ammonia plant, the purification unit for such a feed gas would cost about $1 million complete, including the compressor

it pays to use . . .

MULTI-METAL WIRE CLOTH · FILTER CLOTH
FILTER LEAVES · SCREENS

Whether it's wire or filter cloth, filter leaves, or semi or complete processing or handling equipment, Multi-Metal offers you the long experience, research, engineering and design service and precision fabricating facilities to build just what you need.

MULTI-METAL MAKES . . .

Wire cloth of any mesh, weave and alloy; by the roll or in fabricated units of any type and size.

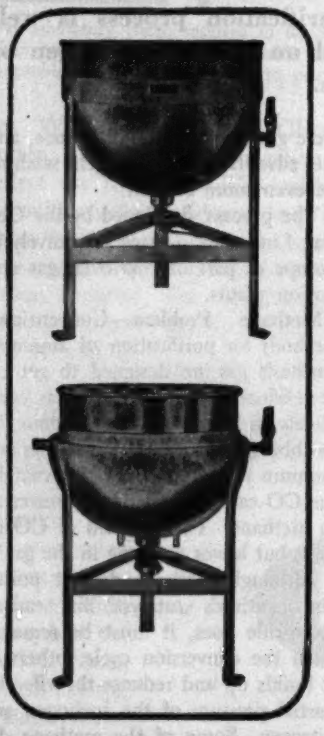
Screens, filter leaves, strainers, sieves, discs, pads, baskets, trays, conveyor belts, semi-apparatus and complete processing equipment.

Write for Multi-Metal Catalog. It's packed with technical data and project planning aids. It's free.

Vertical pressure filter leaf
Write for a Copy
Leaves for horizontal pressure filter
Screen for filter plate
Combination fine wire cloth, sheet metal cribbing and flanges

MULTI-METAL WIRE CLOTH CO., INC.
1353 GARRISON AVENUE · NEW YORK 59, N. Y.

LEE
CORROSION-RESISTANT
KETTLES



Lee Kettles meet every processing need. They are practical, easy to clean and keep clean, meet all sanitary regulations and are available in sizes up to 500 gallon capacity.

For longer service and greater all-around dependability, specify LEE *Corrosion-Resistant Kettles.*

Our descriptive technical bulletins sent on request.

LEE METAL PRODUCTS CO., INC.
417 PINE STREET, PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

building but excluding, of course, the air separation unit. Per ton of NH_3, the purification unit would use 200 kwh. of power and 8,330 gal. of cooling water.

The basic process, however, is very flexible and can be tailored to the specific requirements of each operation. For example, if liquid hydrocarbon streams are withdrawn, the low-temperature refrigeration requirements will increase. If desired, hydrogen of over 98-percent purity can be produced by passing the overhead from the wash column through a condenser cooled with liquid nitrogen boiling at less than 2 psi. absolute.

Merger to Give San Jacinto Greater Ammonia Capacity

San Jacinto Chemical Corp. will be merged with Smith-Douglass Co. Simultaneously, capacity at San Jacinto's ammonia plant will be boosted from 70 tons a day to 110 tons daily. This will cost $1.6 million.

San Jacinto Chemical produces anhydrous ammonia in a plant at the San Jacinto Ordnance Depot in Texas. It leases this plant from the government.

The merger calls for Smith-Douglass to acquire all 250,000 outstanding shares of San Jacinto common stock. Smith-Douglass would issue to San Jacinto stockholders $1 million in 5 percent convertible subordinated debentures due in 1973 and 75,000 shares of Smith-Douglass common stock. Thus Smith-Douglass would be the surviving corporation.

The Houston plant would become known as the San Jacinto Chemical Division.

Mathieson Acquires Insecticide Producer

Mathieson Chemical Corp. will acquire John Powell & Co., Inc., producer of insecticides. Negotiations for the acquisition have been completed.

Powell, founded in 1923, has developed insecticides, herbicides and rodenticides. Mathieson will now get four Powell pesticide plants at Brooklyn, N. Y., Atlanta, Ga., East Omaha, Neb., and Elkton, Md.

Mathieson, a manufacturer of basic chemicals for agricultural use, will integrate Powell's distributing system into its own marketing network.

Goal of Philippine Venture Is Rayon From Bagasse

In a bid to free the Philippines from dependence on imports of rayon, currently running at a $50 million a year clip, Rayon Corp. of the Philippines, a new enterprise, will build an integrated viscose plant to convert sugar cane waste into dyed and printed cloth.

Incorporated in Manila as a $30 million company, Rayon Corp. of the Philippines is controlled by sugar producers. J. Amado Araneta holds a 51 percent interest.

The plant, already under construction, is being built in the province of Negros Occidental, one of the world's important sugar producing areas. Thousands of tons of bagasse have been burned there each year. Now the bagasse will be used in rayon production.

Equipment for the integrated plant will be furnished by Oscar Von Kohorn & Co., Ltd., of New York. A staff of 80 chemists and engineers from Kohorn's affiliate, Kohorn Constructora de Plantas Rayon S. A. of Panama, will help to solve engineering and operating problems.

Two additional chemical plants will be part of the integrated set-up. One will produce carbon bisulfide and also sulfuric acid by the contact process. The other will make chlorine and caustic soda.

Initially, about 30 to 45 million yards of cloth will be turned out annually. It will take about one week to convert bagasse into printed cloth. Later the plant may get into tire cord manufacture and cellophane production.

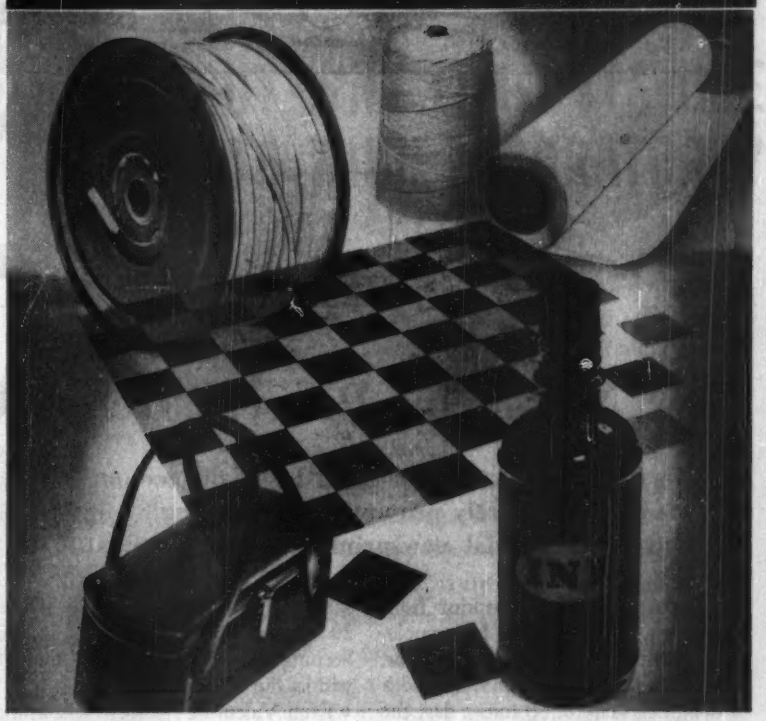
Atomic Manufacturing Plant Will Be Privately Financed

Parts for atomic power plants will be made in a new multi-million dollar plant of the Atomic Power Division of Westinghouse Electric Corp. Now under construction, the plant will be located on a 40-acre site about 10 mi. northeast of Pittsburgh, Pa.

The new plant is believed to be the first privately financed atomic manufacturing venture. Westinghouse expects to invest about $2 million in equipment and machinery.

When the atomic plant starts operating late this year it will employ about 200 workers. Additional workers will be hired as needed.

"KTPL" STYRENE RESINS for Superior Products



• Koppers now offers these new low-cost "KTPL" styrene resins in four different molecular weight ranges—relatively low to moderately high. The versatility of "KTPL" resins adapts them for varied applications in waterproof coatings for paper, textiles, cable and wire insulation. Other uses include leather finishes, impregnation of twine, wood, and textiles, and as modifying agents for printing inks.

"KTPL-3" Resin has been designed specially for use in the manufacture of dent-resistant, grease-resistant floor tile, which is tough and durable but light-colored and attractive, due to the excellent clarity and light stability of the resin.

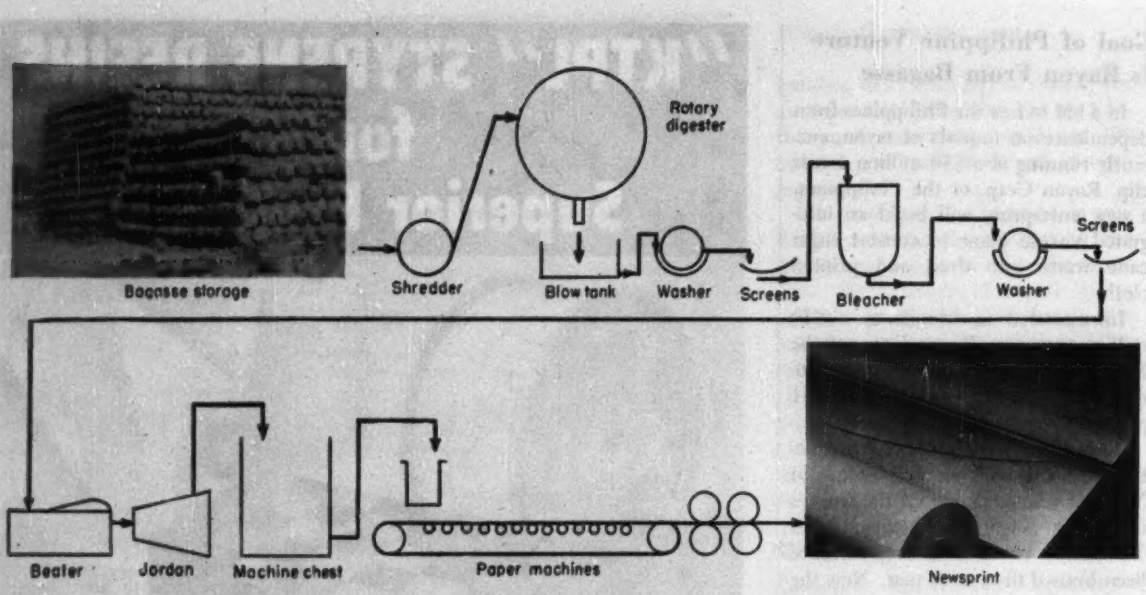
Other grades of "KTPL" Resins are available in a range of softening points so that specific applications can be covered according to specific job requirements.

"KTPL" Resins are produced and shipped in the form of fine beads in 200-pound net fibre drums or in 65-pound net multiwall paper bags.

For additional information about "KTPL" Styrene Resins, write Koppers for free Technical Bulletin C-3-177.

KOPPERS COMPANY, INC.
Chemical Division · Dept. CE-73
Pittsburgh 19, Pa.

KOPPERS ® Koppers Chemicals



New Newsprint Process Defies Old Snares

Processing know-how plus just-right economic conditions have apparently prompted the building of the country's first commercial newsprint-from-bagasse plant.

A plant to make newsprint from sugar-cane bagasse is due for completion in Lockport, La., late this year. Costing an estimated $2,633,200 with a design capacity of 50 tons a day, the plant will be operated by Valentine Pulp & Paper Co., a newly organized subsidiary of Valite Corp.

Newsprint of 100-percent whole bagasse pulp has been made in a pilot plant, and tests have been run on the presses of three Louisiana newspapers. A small pilot roll was run for strength tests on the high-speed presses of the New Orleans Times-Picayune with satisfactory results.

With announcement of this project, Valentine seems to be flying in the face of a good many doubting Thomases.

• Many experts take a dim view of the economic possibilities for paper from bagasse in this country on the grounds that our supply of the sugar-cane waste is not profuse enough and wood pulp is readily available.

• Application-wise, book and writing papers are usually cited as the best economic bets for bagasse, with newsprint at the bottom of the list—particularly newsprint completely made of bagasse. Most recommendations for the best use of bagasse in newsprint suggest that it replace only the 15 to 20 percent chemical pulp content, keeping the groundwood content within the normal range.

• Even Valentine's plan to use whole bagasse as raw material conflicts with the widespread belief that development of a good method of separating pith from bagasse fiber is the key to utilization of the fiber for manufacture of pulp and paper.

However, the very fact that Valentine is spending this kind of money is pretty strong counter-argument. Its ability to defy the traditional snares is probably based on an ideal combination of processing know-how and economic conditions.

▶**Bagasse Veterans**—The parent company, Valite Corp., is a veteran at utilizing bagasse. Its principal business is the production of plastics and resins from the fiber.

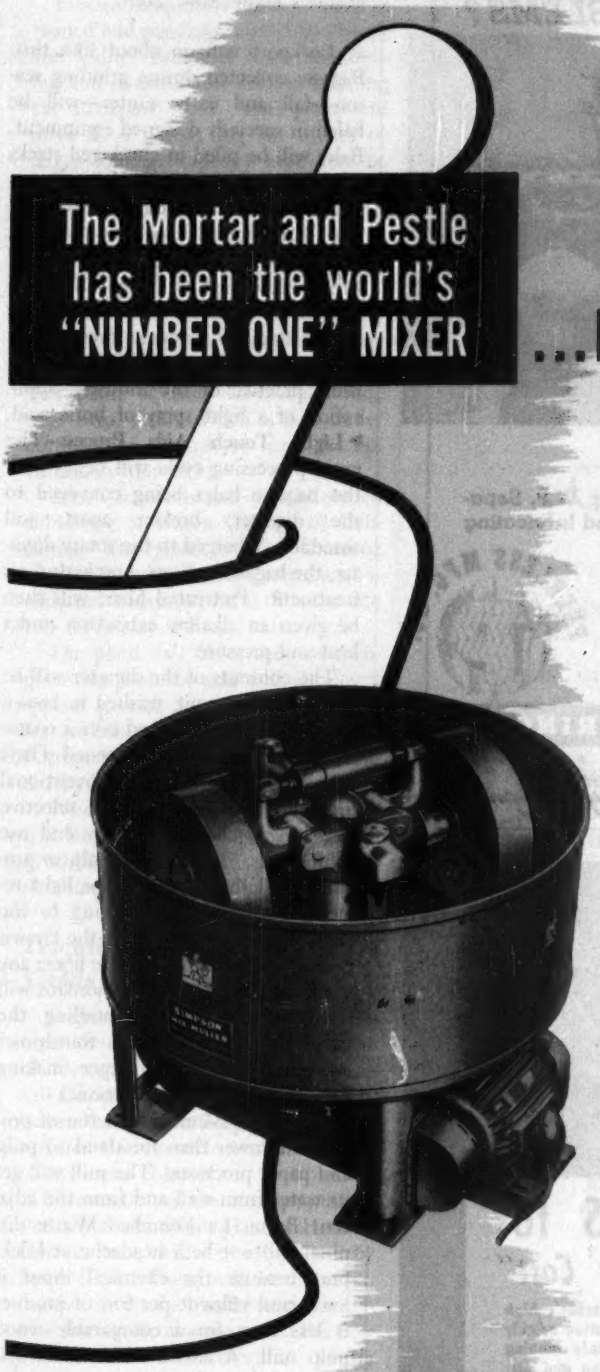
Edward L. Powell, a chemical engineering consultant who has specialized in bagasse utilization for 12 years, is responsible for Valentine's basic process; it will be modified by certain operations developed by Valite. Briefly, the pulping process comprises a prehydrolysis treatment of the bagasse followed by alkaline extraction. Residual pulp is bleached by any of several cycles, depending upon its intended use.

According to Valentine spokesmen, high yields and relatively low investment and production costs allow pulp and paper of any variety to be produced at costs comparable to any other existing process. They say that Powell avoided a mistake of many other investigators who applied conventional woodpulping schedules in evaluating bagasse as a paper-making material. The conventional schedules give pulp yields of less than 20 percent, while Powell's method is reported to show consistent values of 50 percent. Although full details on the process are not available, the guess of some men in the industry is that its success rests on using a lighter touch throughout, e.g., less cooking, weaker caustic.

▶**Location, An Asset**—Another substantial asset for the new venture is its location. Louisiana is about the best U. S. location for a bagasse-consuming plant. Within 100 miles of Lockport, 750,000 tons of bagasse is produced annually and only about 200,000 tons is being utilized commercially. Unlike many other sugar-producing areas, natural gas-rich Louisiana need not depend on bagasse as a cheap fuel for its refineries. Valite's sister company, Valentine Sugar Co., and other refineries in the vicinity can meet all requirements for bagasse in the foreseeable future.

The actual sequence of operations

The Mortar and Pestle has been the world's "NUMBER ONE" MIXER



...BUT WHY LIMIT ITS USE TO YOUR LABORATORY?

SINCE the days of the ancient Greeks, the *mortar and pestle* has been one of the primary means of preparing materials where intimate blending is vital. The rubbing, smearing action accomplished in a mortar and pestle is the basis for present-day mixing practice . . . although *all* mixing equipment does not produce these desired results. In processing work, true *intensive* mixing is called MULLING, because it can be accomplished only in a muller-type mixer. Here, the components are not merely placed next to each other—but are thoroughly blended together to form a completely uniform, inseparable mass.

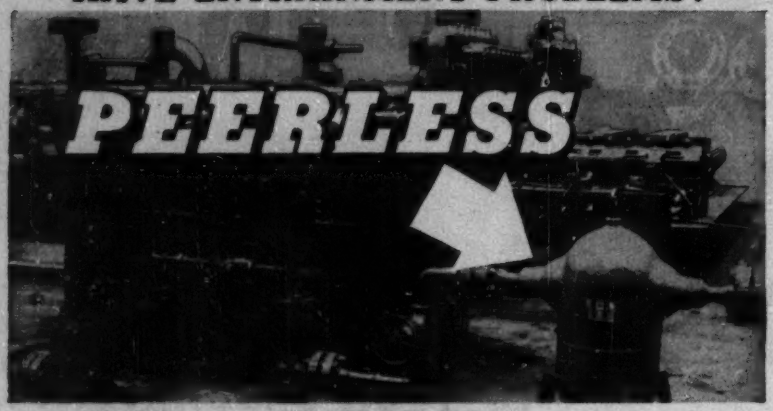
Utilizing a special pair of revolving mullers and plows, the SIMPSON MIX-MULLER is designed to duplicate the controlled uniformity which you may now be producing by the mortar and pestle method in your laboratory. Thus, with SIMPSON MIX-MULLERS, you can be sure that your production mixing can be just as carefully and accurately controlled as laboratory or pilot plant mixing. Manufactured in 12 basic models, in batch capacities from 1/10 to 60 cu. ft., SIMPSON MIX-MULLERS may be equipped to meet your processing needs . . . as a reaction vessel . . . for heating or cooling while mixing . . . in stainless or other special metals. Backed by 40 years of specialization in mixing equipment and problems, our engineers will welcome the opportunity of helping you to bring "laboratory control" to your production floor.

Write for literature.

SIMPSON *MIX-MULLER*® DIVISION

NATIONAL ENGINEERING CO., 604 Machinery Hall Bldg., Chicago 6, Ill.
(Not Inc.)

HAVE ENTRAINMENT PROBLEMS?



HAS the ANSWER . . .

Pictured above is a Peerless 5000# W.P. Separator. It is removing condensate and lubricating oil from the reaction gas to prevent contamination of the catalyst, for production of ammonia.

Consult Peerless for help in solving your entrainment problems.

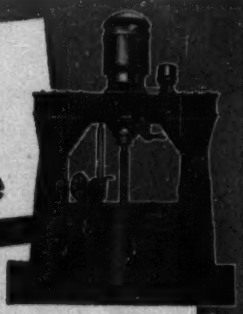
PEERLESS MFG. CO.

PEERLESS MANUFACTURING CO.

P. O. BOX 7193 * DALLAS, TEXAS * Dixon-8431

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Keep your Centrifuging Costs in Line



Install FLETCHERS for "High Production at Low Cost"

Costs are held to a minimum because of Fletcher's *high speed at every phase of operation.* Fast acceleration quickly brings basket to full efficiency and highest safe running speed. Rapid braking cuts time between running and discharge. Unloading is quick and simple because the exclusive Centroid Control allows basket to revolve at the desired speed as long as needed for discharge.

For details . . . get our Chemical Industry Catalog and for savings . . . get Fletchers.

FLETCHER CENTRIFUGALS

at Lockport will go about like this: Bagasse collected during grinding season—fall and early winter—will be baled in specially designed equipment. Bales will be piled in checkered stacks to prevent combustion and for preservation. By this method of storage, intense fermentation takes place initially, then stops altogether. The result of this bacterial action is that moisture content is reduced from 50 percent to less than 20 percent. Preservation of the stacked bagasse will follow the usual practice of the industry—application of a light spray of boric acid.

▶**Light Touch Aids Process**—The rapid processing cycle will begin with the bagasse bales being conveyed to the digester, broken apart and shredded. Charged to the rotary digester, the bagasse will get a prehydrolysis treatment. Pretreated fibers will then be given an alkaline extraction under heat and pressure.

The contents of the digester will be blown to a blowpit, washed in brown stock washers and passed over a coarse screen. Washed and screened fibers will be transferred to conventional bleachers for one of several selective bleaching cycles dictated by end use of products. The washed pulp so produced will then be ready for light refining schedules before going to the paper machine. Because of the known characteristics of the bagasse fibers any stock refining in beaters or jordans will be necessarily light. Handling the pulp on the cylinder or fourdrinier machines and other paper making equipment will be conventional.

Water requirements per ton of product are lower than for standard pulp and paper processes. The mill will get its water from well and from the adjacent Bayou La Fourche. Waste disposal will not be a headache at Lockport because the chemical input is lower and effluent per ton of product is less than for a comparable wood pulp mill. A closed white water system will be used.

Because of the generic qualities of the bagasse fiber and ease of purification, strength for strength and weight for weight a much thinner sheet of paper can be produced. This, of course, offers distinct advantage for some applications. Pilot-plant production has already been made of high-grade book papers, bond papers, grease-proof papers, tag board, in addition to newsprint.

Process designs are based on patents (issued and pending) owned by Powell and Valite. Brown & Root, engineering and construction firm, is building the Lockport plant. This plant will serve as a guinea pig for others of larger tonnage capacity that may be built in the sugar-growing areas of the world.

Ammonia Plant in California Being Built by New Producer

Over 200 tons a day of ammonia will be produced in the new $13 million plant of Brea Chemicals, Inc., near Brea, Calif., which is now under construction. It will be ready for operation in May 1954.

Brea Chemicals is a wholly owned subsidiary of Union Oil Co. of California. The plant is being financed and built by Amoniaco Corp., a non-affiliated company, on a 30-acre site two miles east of Brea.

The plant will have many new engineering features and will employ a special process to produce ammonia for western agriculture and industry. Raw material will be natural gas from nearby wells.

When it opens next year, the plant will have an annual payroll exceeding $750,000. C. F. Braun & Co. is constructing the plant for Amoniaco.

Trichlorethylene Process Yields Hydrogen Chloride

A new, highly efficient process has been developed by the Detrex Corp. of Detroit and Hooker Electrochemical Co. of Niagara Falls for the manufacture of trichlorethylene. It also results in the simultaneous production of hydrogen chloride.

Conversion to the new process at the Ashtabula, Ohio, plant of Hooker-Detrex, Inc., will be completed by April 1954. There will be no interruption in production of trichlorethylene during the changeover to the new process. Hooker-Detrex is jointly owned on a 50-50 basis by Hooker Electrochemical and Detrex.

Production of hydrogen chloride by this process opens a new source for this chemical. It will come from the process as a pure gas in a pipeline ready for use in the manufacture of plastics.

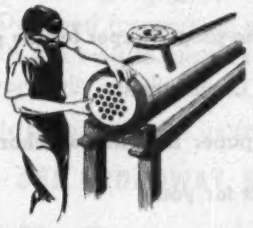
General Tire & Rubber Co. will construct a $6 million vinyl chloride plant next to Hooker-Detrex in Ashtabula. All hydrogen chloride produced

The single cost of TANTALUM is much less than the many costs of CORROSION...

Corrosion costs do not end simply with equipment replacement. A complete analysis must include shutdowns, lost production time, product contamination and spoilage, fume damage to buildings and associated equipment, possible injury to personnel. Compare this myriad of costs against the single outlay for Tantalum, the metal that is not merely "corrosion-resisting", but acid-proof.

If you are processing hot or strong acid solutions, if you are making a pure product in which equipment contamination or side reactions cannot be tolerated, tantalum is probably the most economical material of construction you can use. Experienced Fansteel engineers are at your service for consultation at no cost to you.

Use Tantalum with economy for most acid solutions and corrosive gases or vapors except HF, alkalis, or substances containing free SO_3.



Ask for a copy of our free booklet "Acid-Proof Tantalum Equipment for Chemical Operations"

FANSTEEL METALLURGICAL CORPORATION
NORTH CHICAGO, ILLINOIS, U.S.A.

32402C

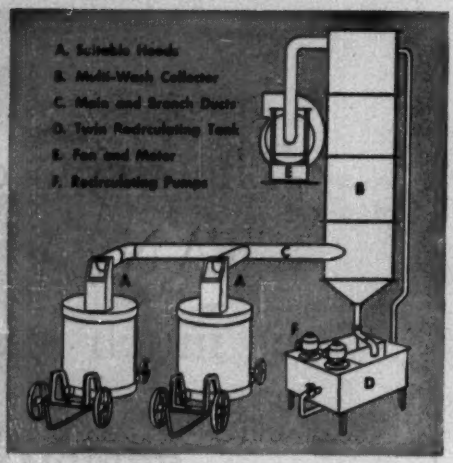
MULTIPLE WASHING cleans the air of most VAPORS and ODORS

If you want the best, most efficient wet-method dust collector working in your plant, specify Multi-Wash.

Schneible patented Multi-Wash system proves that multiple washing rids the air of most dusts, fumes, vapors and gases. Each impingement stage of this collector provides a double washing action, thus assuring top efficiency. The smallest type J. C. Multi-Wash unit provides 8 separate washes while the larger type V. B. unit washes the air 13 times!

Another important feature—this collector requires minimum attention—it functions without moving parts or nozzles.

For further information write for bulletin 551 or contact your local Schneible representative.



MULTI-WASH

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station
Detroit 2, Michigan

SCHNEIBLE

PRODUCTS:
Multi-Wash Collectors • Uni-Pie Standard Hoods • Uni-Pie Compensating Hoods • Uni-Pie Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Recirculating Tanks • "Wear Proof" Centrifugal Slurry Pumps

Filter Paper

E&D Filter Paper

FOR SCIENCE AND INDUSTRY

As manufacturers of filter and absorbent papers we gladly place at your disposal our experience and skill in helping you select the proper paper for the problem confronting you. Or, if a new kind of paper is indicated, chances are we can produce it for you.

Call on us without any obligation.

The EATON-DIKEMAN Co.
"MANUFACTURERS OF FINE FILTER PAPERS"
Mt. Holly Springs, Pa.

by Hooker-Detrex will be piped into General Tire's new vinyl plant.

It took six years of research by Hooker and Detrex to achieve the commercial trichlorethylene process. Pilot plants producing both trichlorethylene and hydrogen chloride were first set up in Detroit and in Niagara Falls in 1947. Detrex, currently the world's largest direct supplier of the chemical to consumers, pioneered the stabilizing process that originally made possible practical commercial manufacture of trichlorethylene.

Refinery Adds Orthoflow Cat Cracker in Expansion

A multi-million dollar renovation at the Amarillo, Tex., refinery of the Texas Co. will double current capacity there.

Units designed by M. W. Kellogg Co. will be installed for crude distillation, delayed coking, Orthoflow fluid catalytic cracking and catalytic polymerization. The crude distillation and delayed coking will be integrated in a combination unit.

Main advantages of the combination type plant lie in lower initial investment cost and reduced operating expense. Investment cost is decreased because intermediate storage facilities are largely eliminated, and certain towers, furnaces and heat exchangers can be designed to handle product streams from more than one process unit. Operating expense is reduced by centralized control and the reduction of heat losses incurred when intermediate products are cooled for storage.

Approximate capacities in barrels per stream day of feed are: crude distillation, 15,500; delayed coking, 3,600; cat cracking, 6,000 (about 10,000 with recycle). The polymerization unit is rated at about 470 bbl. per stream day of polymer gasoline. These figures are based on the processing of Panhandle crude, although the refinery is also designed to handle Hockley crude.

The catalytic cracker will be of Kellogg's most modern design, the Orthoflow. This is the tenth of this new type cracking unit to be erected or scheduled, the first one having been put on stream about a year and a half ago.

"Although this is the first Orthoflow we have designed for the Texas

Co.," says President Warren L. Smith of Kellogg, "it marks the eighth fluid unit we have undertaken for this refiner in the United States." Engineering is under way on all the new processing equipment, and construction starts this summer.

Other major processing equipment in addition to that under contract to Kellogg has also been scheduled. Cost of the new equipment and revamping necessary to complete the renovation at the Amarillo refinery is estimated at several million dollars.

CONVENTION CALENDAR

American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, June 29-July 3.

American Pharmaceutical Association, Salt Lake City, August 16-22.

American Chemical Society, fall meeting, Conrad Hilton Hotel, Chicago, September 6-11.

American Institute of Chemical Engineers, Fairmont and Mark Hopkins Hotels, San Francisco, September 13-16.

National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, September 16-18.

American Association of Textile Chemists & Colorists, annual meeting, Conrad Hilton Hotel, Chicago, September 17-19.

American Coke & Coal Chemicals Institute, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., October 12-13.

Salesmen's Association of the American Chemical Industry, chemical sales clinic, Commodore Hotel, New York, October 19-20.

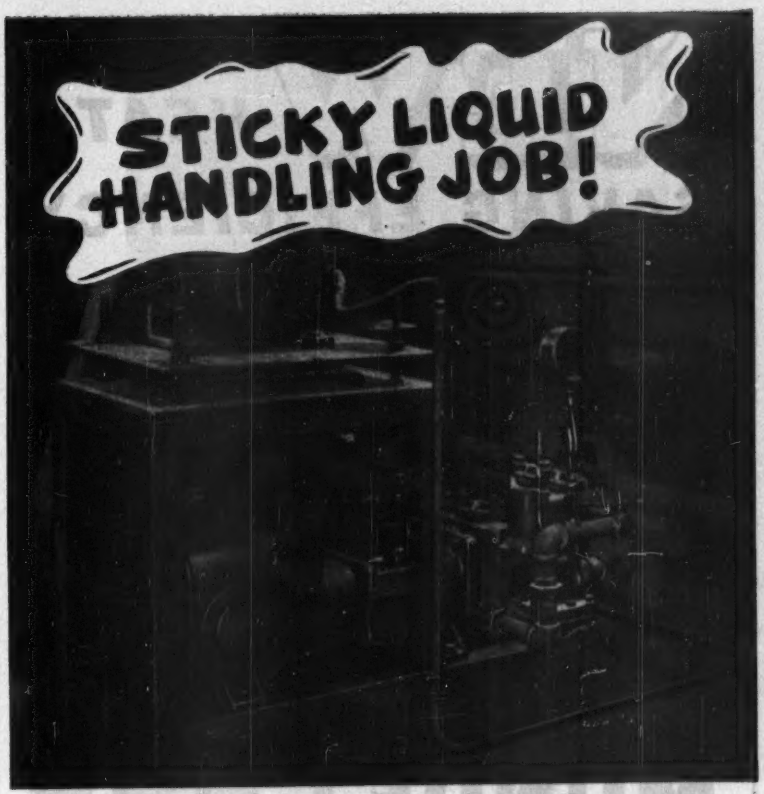
National Paint, Varnish & Lacquer Association, annual meeting, Chalfonte-Haddon Hall, Atlantic City, October 26-28.

Association of Consulting Chemists & Chemical Engineers, annual meeting, Belmont Plaza Hotel, New York, October 27.

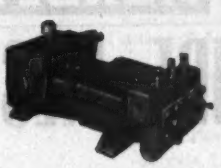
American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago, November 9-12.

24th Exposition of Chemical Industries, Commercial Museum, Philadelphia, November 30-December 5.

American Institute of Chemical Engineers, annual meeting, Jefferson Hotel, St. Louis, Mo., December 13-16.



Handled by Deming Pumps



Pumping starch-paste is the job of four Deming Fig. 2993 "Oil-Rite" Horizontal Triplex Pumps in a factory making large paper bags for a wide variety of products. The paste is the adhesive used in sealing the bottoms of the heavy-duty bags.

From three to six months was the maximum life of all pumps used before the Deming "Oil-Rite" Triplex Pumps were installed in April 1951. Up-to-date, all four Deming units have pumped away without a breakdown.

This is one of a multitude of high pressure pumping jobs handled successfully by Deming Fig. 2993 "Oil-Rite" Horizontal Triplex Pumps. Designed for working pressures up to 1000 pounds, these units are built to produce a steady, uniform discharge with practically no vibration.

Ask your Deming Distributor or write us for full details.

THE DEMING CO. • 525 BROADWAY, SALEM, OHIO

DEMING *Industrial* PUMPS

NEW HEAT SAVING EFFICIENCY

- *Longer Life*
- *Custom Molded Precision Pipe Fit*
- *Attractive, Smooth Finish*

Now available in pipe covering and block insulation, Mundet 85% Magnesia permits new heat-saving efficiency. Precision manufacturing on the latest type of automatic equipment insures uniform standards. Extra durability is built into the insulation. It does not "powder", settle or disintegrate. It is unaffected by either steam or water leakage. It maintains an attractive, smooth finish. Precision pipe fit is assured, with no spaces left for the escape of heat. You benefit from the most modern manufacturing facilities for the production of heat insulation. Write for specification information and recommendations. Mundet Cork Corporation, Insulation Division, 7101 Tonnelle Avenue, North Bergen, N. J.

MUNDET

MUNDET

WIRE MESH

Maybe it all *does* look pretty much the same at first glance. But when a firm has been making wire mesh for 73 years man and boy, there's bound to be a little more to it than meets the eye—a little more know-how in engineering and weaving, a little more quality in the product, a little more service and satisfaction for the user.

JELLIFF WIRE MESH is woven in all ductile metals
JELLIFF WIRE MESH is woven in all commercial weaves
JELLIFF WIRE MESH is woven in widths up to 72 inches
JELLIFF WIRE MESH is economical. Every foot runs true to the specifications.

★ ★ ★ ★

JELLIFF WIRE MESH is a quality product and has been for 73 years. You can depend on it.

Write today for full details about JELLIFF WIRE MESH, JELLIFF WIRE MESH PRODUCTS, and JELLIFF'S CONSULTATION SERVICE on wire-mesh engineering. Address Department 15.

THE C. O. JELLIFF MFG. CORP.
DIPPING BASKETS
LEKTROMESH
RESISTANCE WIRE
WIRE MESH PARTS
WIRE CLOTH
STRAINERS • FILTERS
SOUTHPORT CONNECTICUT

New Solvent Process Means Better Reactant Dispersion

Solids are converted into dry, finely divided powders that flow freely by a process developed by the National Research Council of Canada. Dr. I. E. Puddington, director of NRC's Division of Applied Chemistry, devised the new method.

The principle can be used in many chemical reactions where surface area is important for uniform dispersion of one reactant in another. It can also be used where dispersed particles are to remain in suspension.

In making soaps and lubricants, for instance, caustic is used to saponify fatty materials. If the alkali particles vary in size, or if the particles are caked, the alkali will not be uniformly dispersed. Surface areas will vary, and there may be large lumps. Hence saponification will not proceed uniformly throughout the mass.

With the NRC process, however, a uniform alkali powder is produced. This, in turn, makes possible a uniform dispersion. Thus the manufacture of soaps and lubricants is much easier to control.

In the NRC process, the solid is dissolved in a solvent having a critical temperature below the melting point of the solid. The resulting solution is heated in a closed vessel to an intermediate temperature, higher than the critical point of the solvent but lower than the melting point of the solid. This process removes the solvent as a gas and leaves the solid in a finely divided state. Aerating the mass recovers the solid as a finely divided, free-flowing powder. Canadian Patents & Development Ltd. of Ottawa is licensing the NRC process.

Ozone Used to Oxidize Pinene to Pinic Acid

Methods for producing pinic acid from alpha pinene, a component of turpentine, will be investigated by the Armour Research Foundation for the Southern Regional Research Laboratory of the U. S. Department of Agriculture under a two-year contract with the government.

Synthetic lubricants for turbojet engines can be made from pinic acid, as recent research carried on by the Southern Laboratory and the Naval Research Laboratory has shown. These

synthetic lubricants can replace others now made from castor beans, which have been largely imported.

Ozone in different concentrations will be tested in pinic acid production. Armour Research Foundation has recently developed methods for the production of high concentrations of ozone in volume and improved techniques for handling ozone in the oxidation of chemical compounds.

An important goal will be the development of commercial methods for producing both pinonic and pinic acids at a cost comparable to that of other dibasic acids, such as sebacic acid from castor beans.

This research for the Department of Agriculture will be integrated with expanded research at Olustee, Fla., by the Southern Laboratory's Naval Stores Research Division on the economic production of pinic acid and the evaluation of its esters, amides and polymers in the production of synthetic lubricants, plastics, plasticizers and synthetic fibers. Purpose of this research is to add to present knowledge of how to produce pinic acid and its derivatives and ultimately to increase consumption of turpentine.

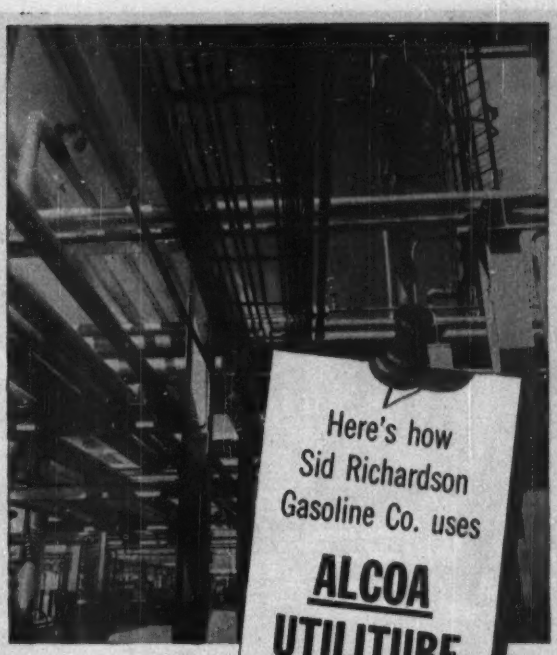
Project directors for Armour Research Foundation are Dr. R. L. Bond and Dr. Frank Holloway. Coordinating the Armour research with that of the Department of Agriculture will be E. L. Patton, head of the Naval Stores Research Division.

New Process Will Make Fluorinated Organic

A brace of new plants will be added at the Baton Rouge, La., works of Allied's General Chemical Division. One will be a contact sulfuric acid plant, the other a plant to produce trifluorochloroethylene, an important organic fluorine chemical used by the plastics industry.

The trifluorochloroethylene plant will utilize a new process developed by General Chemical's researchers and engineers. It will become part of General's other extensive facilities at Baton Rouge for making organic fluorine compounds, including refrigerants, aerosol propellants and industrial chemicals.

Big use for trifluorochloroethylene is as the monomer, which is a base material for the manufacture of high-fluorine plastics characterized by extreme chemical resistance and high thermal stability.



Control-Instrument Air Lines of ALCOA UTILITUBE* at Keystone Plant, Kermit, Texas. Exposed to hydrogen sulfide fumes since installation in 1948, aluminum tubing and fittings have required no maintenance, show no apparent corrosion. Air, dried by Alcoa Activated* Alumina, operates at 80° F and 25 psig.

ALCOA UTILITUBE is aluminum coiled tube made of a specially selected alloy to provide low cost, easy workability and high fatigue strength.

ALCOA Utilitube offers savings up to 40 per cent over copper . . . has excellent on-the-job forming and flaring properties. It is available in economical, long lengths up to 1,000 feet or more, depending on size. It stands up well under vibration . . . has high resistance to most industrial atmospheres and to many liquids and gases.

In petroleum service, ALCOA Utilitube will not form sludge or gum . . . will not discolor or contaminate the fluid it carries.

ALCOA Utilitube is versatile. Use it for air for pneumatic and hydraulic control circuits and brake lines—gasoline and fuel oil for internal combustion engines—lubricating oils for engines and machines—fluids for hydraulic systems.

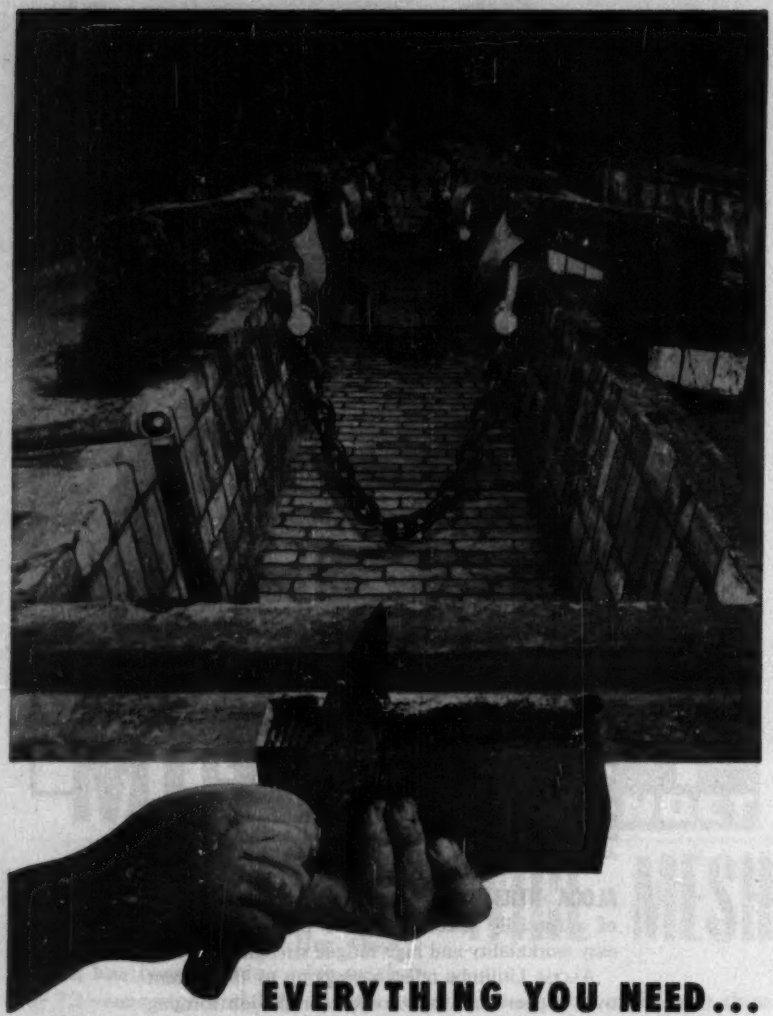
For complete details, write for the new booklet: "Alcoa Utilitube."

ALUMINUM COMPANY OF AMERICA
1001-G Alcoa Building, Pittsburgh 19, Pa.

*Registered Trademark, Aluminum Co. of America

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA



EVERYTHING YOU NEED...

OR MAY NEED ... in a corrosion-proof cement

LOOKING beyond present needs, your unforeseen or future requirements are fulfilled by Atlas ALKOR® 5E. This one furane resin cement resists acids, alkalies, salts, greases, solvents and oils at temperatures to 380° F. . . . providing a range of protection you should have against unforeseen factors or eventual process changes.

And, you have long-term protection with ALKOR 5E. By every accepted test, ALKOR 5E has proved superior in both physical and chemical properties . . . as well as in important considerations of use. ALKOR 5E is safe to install. *It will not contribute to skin disorders . . . and has no objectionable odor.*

ALKOR 5E HAS NO EQUAL

ONLY ALKOR 5E combines *low shrinkage* that means level joints . . . *high adhesion* to brick of over 700 psi . . . *long working time* that cuts material waste . . . *fast setting time* for practical use . . . with *virtually universal resistance* to corrosion.

FOR COMPLETE FACTS, send for Bulletin 5-2.

ATLAS PRODUCTS STAND
...between your process and corrosion

ATLAS MINERAL — PENNSYLVANIA

Engineering Representatives Throughout the United States

Output of the new contact acid plant, scheduled for operation by the end of this year, will help to meet General's own increased demand for sulfuric at Baton Rouge and at its other plants in the South. General will also furnish acid from the new plant to industrial consumers in the Gulf State area.

These new facilities mark the company's seventh major expansion at Baton Rouge since 1945, when General Chemical first erected an anhydrous hydrofluoric acid plant there to meet wartime demand for this chemical in the manufacture of aviation gasoline. Construction of the trifluorochloroethylene plant and the contact sulfuric unit will be handled by Ralph M. Parsons Co. of Los Angeles.

Monsanto Will Boost Its Output of Isocyanates

Production of isocyanates will be stepped up by Monsanto Chemical Co. A multi-million dollar expansion of facilities for manufacturing isocyanates is planned by Monsanto.

Growing markets for isocyanates, according to Vice President J. L. Christian, general manager of phosphate operations, led to the decision to construct these new plant facilities. The new synthetic rubbers and plastics that foam in place are providing added demand for isocyanates.

The new plant will expand the present production capacity of Monsanto for isocyanates. It will follow nearly 10 years of research, pilot-plant work and market development. Many chemical engineering problems unique to isocyanates manufacture had to be solved before the plant could be built. Its location has not yet been disclosed.

AEC Adds Dozen Newcomers To Nuclear Power Project

The Atomic Energy Commission has approved 12 more companies as associates with Dow Chemical Co. and Detroit Edison Co. in a joint study with the AEC on the possibility of developing a nuclear reactor to produce power.

The 12 companies added to the project are: Consolidated Gas Electric Light & Power Co. of Baltimore, Hartford Electric Light Co., Niagara Mohawk Power Corp., Potomac Electric Power Co., Rochester Gas & Electric

Corp., Southern Co., Allis-Chalmers Manufacturing Co., Bendix Aviation Corp., Ford Motor Co., United Engineers & Constructors, Inc., Atlantic City Electric Co. and Gibbs & Cox, Inc.

Addition of the 12 companies brings to 25 the number officially associated with the Dow-Detroit nuclear power project.

Carbon Black: A steam jet process is used by Copolymer Corp. at Baton Rouge, La., to mix carbon black thoroughly into rubber in its liquid state. The process imparts a 20 percent improvement over tires made of the best cold GR-S rubber produced by other methods.

Dibutyl Maleate: Dewey & Almy Chemical Co. is producing dibutyl maleate for sale at 30 c. per lb. in tank-car quantities, a new low price. Dibutyl maleate is used as a plasticizer, for polymerization reactions in general and specifically with vinyl chloride.

Sulfur: A mobile unit will be used by Standard Sulphur Co. to mine 150 to 200 long tons a day of sulfur from the Damon Mound in Texas. Being built at a cost of $450,000, the unit will be ready to operate this summer. It will be on skids so that it can be moved easily.

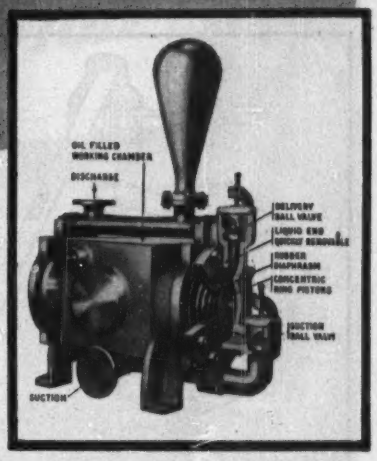
Bisulfite: Output of sodium bisulfite will be increased at least 50 percent at the Everett, Mass., plant of Monsanto Chemical Co. A network of distributors to market the bisulfite is being set up throughout the country. Increased demand came after tests at Penn State showed that sodium bisulfite preserves silage.

Nickel: A deposit of at least 40 million tons of nickel ore has been discovered near Moa Bay, 500 mi. east of Havana, Cuba, by Freeport Sulphur Co. Estimated nickel production is potentially 30 million pounds per year. A pilot plant will be erected.

Potassium Carbonate: Increasing its capacity for potassium carbonate, Allied's Solvay Process Division will build a $2 million plant at Solvay, N. Y., to produce liquid, calcined and hydrated grades. The plant will be completed in the second quarter of 1954.

Handle Any Fluid Economically

no matter how
corrosive • abrasive
thick • heavy
viscous



Install the pumps that can really "take it." Save on over-all operating and maintenance costs. Here's why Shriver Diaphragm Pumps last longer —

- No contact between fluid handled and mechanical parts of pump.
- No packings, hence no leakage.
- Easy to inspect and clean.
- Minimum maintenance cost.
- Parts contacting fluid made of any metal, rubber or synthetic resin lined.
- Ample pressure; wide capacity range.

Bulletin 137 tells the story. Write.

Details of one fluid end: working mechanism completely separated by rubber diaphragms from the fluid handled.

Shriver Diaphragm Pumps

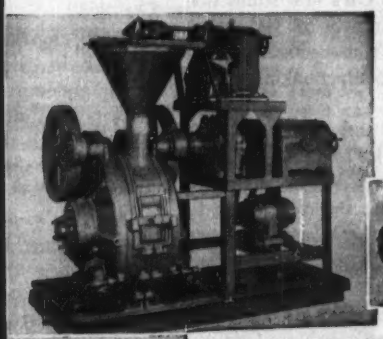
T. SHRIVER & CO., Inc. 802 Hamilton St. · Harrison, N. J.
Filter Presses · Filter Media · Diaphragm Pumps

THE "DAVENPORT" CONTINUOUS PRESS

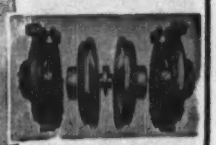
DAVENPORT
De-Watering Presses and Screens

ROTARY
Steam Tube, Hot Air and Direct Fire Dryers.

Water Tube and Air Coolers.



Assembled Press



Revolving Discs

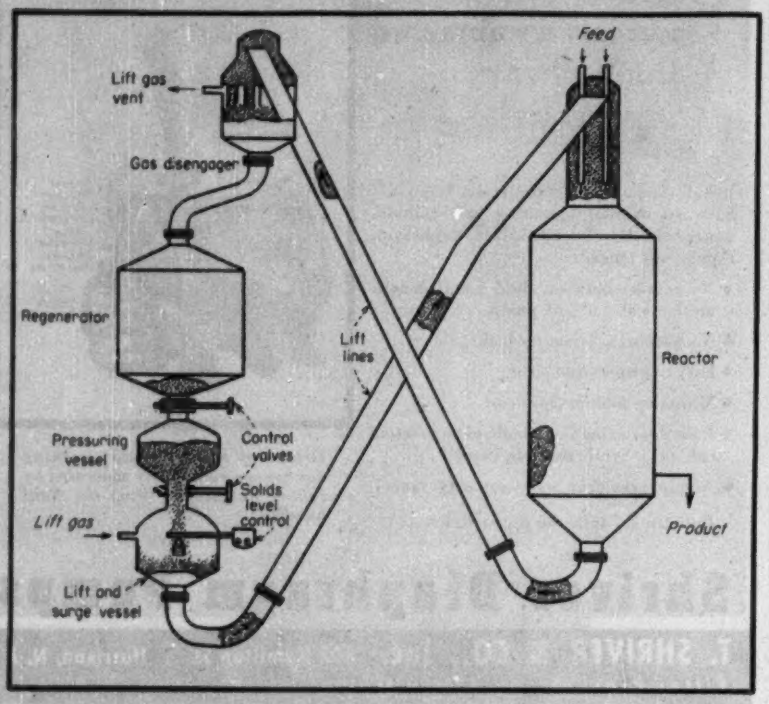
Cross Section

The Davenport Continuous Presses are made in three sizes. Davenport Presses are the most efficient mechanical method of extracting excessive moisture from semi-solids. If you have a moisture problem, let Davenport engineers assist you. Write for our complete catalog.

For quick reference see "Sweet's 1952 Processing Industries" or "Chemical Engineering Catalog, 1953."

DAVENPORT MACHINE and FOUNDRY COMPANY
DAVENPORT 7 IOWA U.S.A.

Pro and Con



Pro: New Gas Lift for Solids

Sir:

I was particularly interested in the news item in your May issue (p. 138) describing Union Oil's new solids lifting technique known as Hyperflow . . . and how it's used in Shamrock Oil's continuous contact coking unit in Texas (see cut).

Is it true, as you state, that the new system can lift pelleted catalysts to cat crackers over 300 ft. high and that it can operate successfully up to 1,200 deg. F. and 600 psi? I notice that another advantage of Hyperflow is that it establishes a positive seal between the reaction vessels and thus prevents the escape of vapors. Can you supply me with more details on how it works?

H. B. Howard
Development Engineer
Charleston, W. Va.

▶ *Yes, both statements are true and have been demonstrated at Union's pilot plant in California. Work has been under Dr. Clyde Berg, director of Union's development department.*

For patent and other reasons, Union is not yet ready to release full details on how Hyperflow works. But the new principle hinges on the lifting of solids as a compact, non-fluidized mass by a small volume of gas rather than as a dilute suspension in a fast-moving gas stream.—Ed.

Pro & Con: Power Reactors

Sir:

As an engineer, I am intensely interested in the possibilities of efficient and economical atomic power reactors for industrial use. I am positive that such reactors will become a reality, say within the next 10-15 years.

But don't you think the Walter Kidde engineers are a bit over-optimistic when they implied in your May issue (p. 133) that construction on the first power reactor might get under way within a year? Or that a 100,000-kw. plant would now cost only $10-15 million? Or that zirconium will eventually be plentiful —as a material of construction—for about $15 a pound?

Frank P. Harris
Chemical and Metallurgical Engineer
Los Angeles 41, Calif.

▶ *Yes, some engineers feel that the Kidde attitude is over-optimistic—but Kidde's engineers don't!*

Maybe they're right, for very recent developments indicate that power reactors are much closer than most people think. Next month we'll bring you the latest information—soon to be de-classified—on what Monsanto, Dow, Bechtel and Commonwealth Edison have found out. Each of these firms has recently completed detailed studies of AEC's reactor development program from the standpoint of power possibilities.—Ed.

Pro: Man-Hour Savers

Sir:

My congratulations to you on the article entiled "Heat Exchanger Costs Today" by Frank Rubin in your May Issue (pp. 201-206). By giving detailed data on both unit costs and factors influencing selection of types, Rubin has made a contribution that should be of immediate and practical value to chemical engineers everywhere . . . an outstanding contribution to the chemical engineering profession and a worthy companion to the Gilmour series on "Shortcuts to Heat Exchanger Design" that you have published in recent issues.

As you know, there has been much talk about the shortage of chemical engineers. To my way of thinking, your two series on heat exchanger design and costs—by saving hundreds of engineers long and tedious hours of calculations—will do as much to alleviate this shortage as all the idealistic pleadings of the professors.

Let's have less talk, more such practical tools to save man-hours. . . .

F. S. Fischer
Works Project Engineer
Montreal, Canada

▶ *Reader Fischer has hit upon one of our prime objectives: To give our readers the tools with which they can do a better job in less time. Our success in this depends entirely upon those engineers who (like Authors Rubin and Gilmour) are willing to pass along helpful information that they have gained over years of hard-won experience and specialization.*—Ed.

Pro: Facts on Engineer Shortage

Sir:

This letter is being written in an effort to obtain your opinion on a subject which has puzzled many engineers and chemists I know throughout the country who are searching for new employment.

We cannot understand, only guess,

NOW you can change speed while Mixer is in motion

International's

ADVANCED SYSTEM OF FLUID AGITATION BRINGS YOU MAXIMUM FLEXIBILITY AT LOWEST COST

"International" Type LRV Mixer

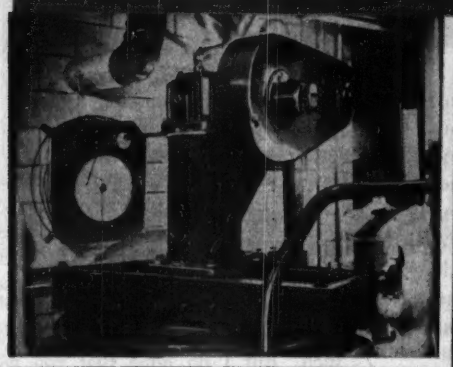
The speed of this unit can be changed while in motion. The capital investment for such a profitable plant improvement is relatively small.

Speed variance as high as 5 to 1 (single speed motor) with any desired speed within the above speed change range. When these units are equipped with vari-speed motor instead of the standard single speed motor an almost infinite range of speeds can be attained in a few seconds.

Speed change accomplished by simply rotating speed change knob. No gears or belts to change.

Useful for viscosity or material change while batch is being mixed. Excellent where various viscosity materials may be mixed in the same vessel.

NO WORK STOPPAGE WHILE CHANGING SPEED—NO GEARS OR BELTS TO CHANGE —NO TIME LOST IN GETTING PROPER SHAFT SPEED FOR BEST RESULTS



"International" Type LRV Mixer

Above photo shows installation in plant where it is desirable to be able to change shaft speed while Mixer is in full operation.

Package units can be readily changed from one vessel to another.

Mixers are package units aligned and assembled in our factory—ready to mount on your vessel and ready to operate.

Mixers are designed for closed or open vessel—"LRV" for closed—"LRVA" for open tanks.

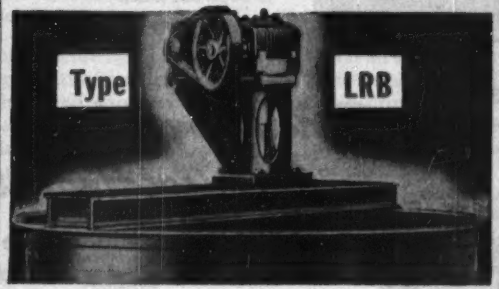
Simplified Designs Guarantee you advantages of most expensive equipment at much lower prices.

"International" Type LRB Mixer

(Illustrated Below)

Speed changes by means of sheave substitution with standard stock taper hubs and adjustment of belt tension requires only a few minutes of operator's time.

20 A.G.M.A. speeds from 420 rpm down to 9 rpm are available and each set up is interchangeable over an approximate 3½ to 1 speed range. Mixers are process engineered—factory assembled—ready to operate when uncrated—and at rock bottom low cost. Arranged for closed or open tanks. Bulletins and full information on request.



INTERNATIONAL ENGINEERING, INC.
DAYTON 1, OHIO

NEW YORK
15 PARK ROW
WOrth 2-2580

CHICAGO
407 S. DEARBORN ST.
WAbash 2-0733

Put your processing problems up to **"International"**

LEADING MANUFACTURERS OF CHEMICAL EQUIPMENT

Heating?
Cooling?
Air Conditioning?
Process?
ASK THE AEROFIN MAN
About Practical Heat Exchange
There is a competent Aerofin heat-transfer engineer near you—qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem—and backed by the research and production facilities of the pioneers in light-weight extended surface.
Ask the Aerofin Man.
Throughout the Chemical Industry—
Aerofin units do the job Better, Faster, Cheaper
AEROFIN CORPORATION
Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

PRO AND CON, *cont. . .*

as to why the typical "brush-off" statement, "Your qualifications are not satisfactory," or words to the same effect, is used so often and at the same time try to correlate this statement with the general, unqualified phrase, "shortage of chemists and engineers."

I would go along with almost anyone if he were to qualify it by stating that there might be a shortage in a particular locality, in a particular industry, a particular company, in a particular pay range or, for example, a shortage of mechanical engineers to do drafting work or a shortage of chemical engineers to do routine chemical analysis.

It is also amazing to note how a person trained in gathering scientific data will, at the same time, try to generalize on a few scant facts obtained at interviews. It is difficult, except for the expertly trained personnel man (of which there are few today) to find out whether a man is suitable for employment in a particular industry or not right off the bat.

Most often the part which is overlooked is the ability of a person to tackle problems well from the fundamentals he has gained by schooling and working. Instead, the employer will want a man that has worked in exactly the same kind of work or industry and from whom he can copy.

In a nutshell, he doesn't want a engineer or a chemist, he wants a college-trained or industry-trained technician. I trust you will understand that I am not speaking of a metallurgist going into the oil refinery, for example. There are extremes, of course.

I hope this doesn't sound like a gripe letter; I did not intend it as such. But I do hope that you will get the "jist" of it—there's something screwy!

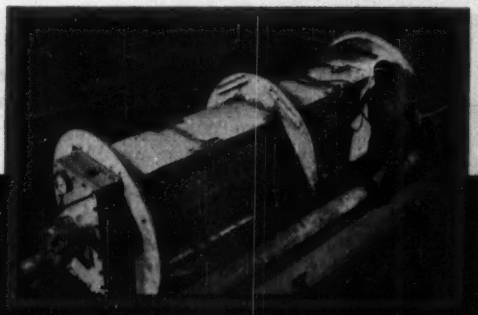
NAME WITHHELD
Chemical Engineer
Los Alamos, N. M.

▶ *We agree with this inquiring reader (name withheld by request) that there is entirely too much use of the vague and general term "shortage of engineers." It boils down to something much more specific: What kind of an engineer for what kind of a job? Industry would do well to be more specific.—*ED.

Perfection 100.0 Percent

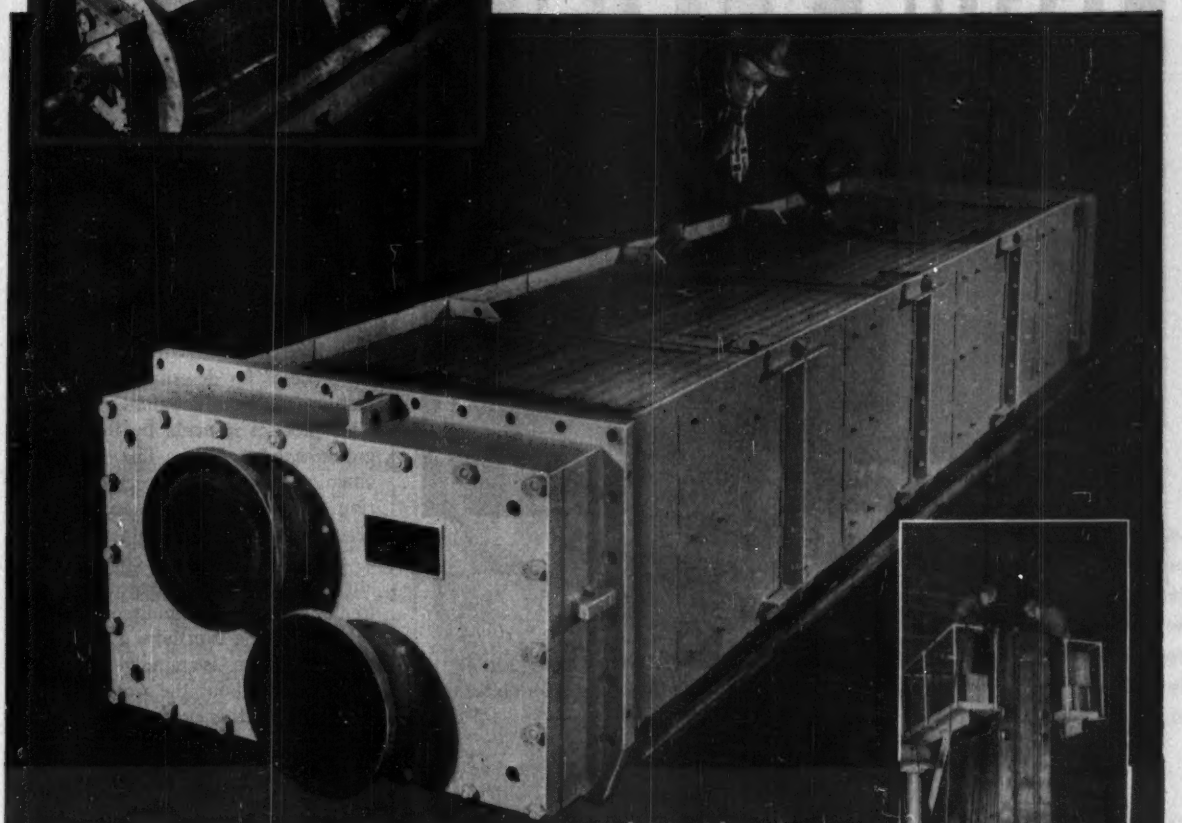
Sir:

I wish to call your editors' attention to two errors in the latest issue of

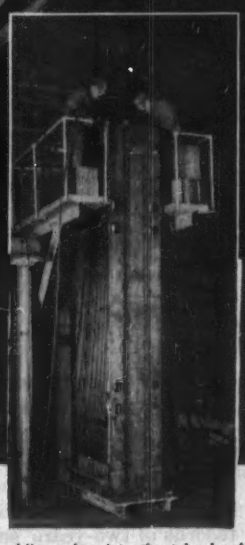


Each heat exchanger is individually hydrostatically tested to insure against leakage during operation. While under test, the by-pass baffles are welded on the unit.

One of the many wind tunnel heat exchanger sections, ready for shipment and installation in the Langley Aeronautical Laboratory supersonic wind tunnel, Langley Field, Virginia.



New **Supersonic** Wind Tunnel Coolers are A. O. Smith **Engineering Achievement**



Assembling tubes into the tube headers for one of the heat exchanger sections.

All wind tunnel coolers for the new supersonic wind tunnel under construction at Langley Aeronautical Laboratory of NACA, Langley Field, Virginia, were supplied by us.

A. O. Smith engineers conceived an original design in these heat exchangers, incorporating many advantages. The most important ones are:

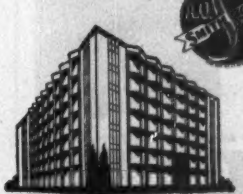
1. High efficiency through balanced distribution of surface and flow areas.
2. Removable tube bundles.
3. Safety from air contamination by water, through elimination of bolted joints inside the tunnel and placing all water lines and connections outside air chamber.

These and many similar features make this one of the most advanced engineering feats in cooling provision for wind tunnels.

Besides manufacturing varying sizes and arrangements of heat exchangers, we also designed cooler housings, accessory equipment, and air by-pass system, calculated ducts and provided installation.

This is an excellent *example* of the completeness and flexibility of A. O. Smith engineering which is available to you to help solve YOUR heat exchanger problems . . . available through our nearest office, listed below.

INDUSTRY COMES TO A. O. SMITH WITH HEAT EXCHANGER PROBLEMS



Research and Engineering Building

A.O.Smith
CORPORATION

VESSELS • HEAT EXCHANGERS

Chicago 4 • Cleveland 15 • Dallas 2 • Denver 2 • Houston 2
Los Angeles 22 • Midland 5, Texas • New Orleans 12
New York 17 • Pittsburgh 19 • San Francisco 4 • Seattle 1
Tulsa 3 • Washington 6, D.C.
International Division: P.O. Box 2023, Milwaukee 1, Wis., U.S.A.

NEW 1953

TEFLON* PACKINGS

BRAIDED TYPE

Chemical plants large and small have long been looking for a permanent acid packing for those "hard-to-get-at" valves.

These valve stems must be packed and made tight at all times. A drip from a leaky valve is dangerous to personnel. These acid valves require 1/8", 3/16", 1/4", 5/16" or 3/8" square packing. Up to now braided blue asbestos packing has been considered best and cheapest (60-day life). Today the whole world of packing has been changed by the miracle material "Teflon". Braided Teflon yarn packing is fast replacing all forms of braided packing for acid service because it lasts as long as the valve itself. Practically no acid, diluted or concentrated, hot or cold, has any affect on the packing. (Many records of two-years' service or more have been reported). This is the big news for 1953 for Chemical Engineers and Chemical Plant Operators.

"JOHN CRANE" Style 704 is available in handy coil or spool form in a full range of sizes. A stock of "JOHN CRANE" Braided Teflon Packing in your storeroom may be a life saver for you.

Teflon is recommended on chemicals at any pressure with temperatures ranging from -100°F. to +500°F.

Many Chemical Engineers prefer "JOHN CRANE" Style 704 Braided Teflon Packings for their service. For the best in mechanical packings fabricated from braided Teflon, contact Crane Packing Company. *Send for this Teflon Technical Bulletin.* Write 1809 Belle Plaine Ave., Chicago 13, Illinois.

*Du Pont's trademark for tetrafluoroethylene resin.

JOHN CRANE CRANE PACKING COMPANY

PRO AND CON, cont. . .

Chemical Engineering. They involve two mispelled words, the first on p. 228 (paragraph 8) and the second on p. 250 (paragraph 11). . . .

J. B. WOOSTER

Brooklyn, N. Y.

▶ *B'gad, and so we did! Two mispelled words in 146 editorial pages. Guess we aren't perfect yet.*—ED.

Mechano-Chemical Process

Sir:

In reading the February issue of *Chemical Engineering*, I noted under the subject "New Processes and Technology 1951-52" on p. 203 that you have used the term "mechano-chemical process" for describing the manufacture of chemigroundwood pulp. This product is made by the chemigroundwood process. The mechano-chemical process refers to the production of a chemical pulp in an open vessel such as a Hydrapulper.

The term "mechano-chemical" is already in rather wide usage in Europe to designate the pulping process developed at the Northern Laboratory, and this term is rapidly becoming known throughout the world in connection with this process.

S. I. ARONOVSKY

Pulp & Paper Section
Agricultural Residues Division
Northern Regional Research Laboratory
Peoria, Ill.

▶ *As Reader Aronovsky points out, the term "mechano-chemical" should be used only to describe the pulping process developed at Agriculture's Northern Regional Research Laboratory.*—ED.

Tips on Heat Exchanger Design

Sir:

Last night I happened to read the article "Shortcut to Heat Exchanger Design—III" by C. H. Gilmour in your April issue (p. 214).

This article was evidently prepared by an engineer thoroughly familiar with all aspects of heat exchanger design, and it is one of the most authoritative and practical treatments I have ever seen on the subject. Mr. Gilmour's "shortcut" methods will be of immediate value to me in my job of designing heat exchangers for a new plant soon to be erected in Ohio

I am looking forward to the remainder of Mr. Gilmour's articles in

his series of shortcuts to heat exchanger design. Can you tell me when they will appear?

S. P. GRANT

Design Engineer
Louisville, Ky.

▶ *We're glad to get Reader Grant's reactions, which are typical of those we've been receiving on the Gilmour series.*

We certainly regard Mr. Gilmour as an authority in heat exchanger design. At Carbide & Carbon (where he has had many years of hard and practical experience) he designs heat exchangers for the S. Charleston, Institute, Texas City and Whiting plants. He has designed more than 500 exchangers involving no phase change and shell cross-flow alone!

The remainder of Mr. Gilmour's articles on heat exchanger design shortcuts will appear in this magazine within the next few months.—ED.

Pro: Goodyear's Pliovic

Sir:

We noted with extreme alarm the product news story on p. 266 of your April issue. This story attributed the newest Pliovic polyvinyl chloride resin to the General Tire & Rubber Co. Up until noting this release, we had been under the delusion that the trademark Pliovic was the property of the Goodyear Tire & Rubber Co.'s chemical division. For the past six years we have been working under this assumption.

Possibly the General Tire & Rubber Co. is an unknown or secret subsidiary of the Goodyear Tire & Rubber Co. or possibly you have some other information which we are unaware of at this time. However, in the unlikely event we are in the clear with the use of this trademark, will you please straighten the matter out with your proof-readers, typesetters and other indispensable personnel.

I. N. LANNING

Chemical Division
Goodyear Tire & Rubber Co., Inc.
Akron 16, Ohio

▶ *Reader Lanning chides us—with good reason and a keen sense of humor—for the blooper we pulled.*

We were convinced, but evidently our printer wasn't. He ignored our correction.—ED.

We welcome short, pertinent letters from our readers giving their opinions on developments in the chemical engineering profession and in the chemical process industries. Address the Editor, Chemical Engineering, 330 West 42nd Street, New York 36, N. Y.

can be just as important to you!

Your life line . . . the single thing that keeps your plant operating at a profit . . . is efficient and continuous production. Your profits, employee morale, plant-community relations . . . all can be seriously threatened by inadequate dust or fume control.

KIRK & BLUM, for over 45 years, have been specialists in designing, fabricating and installing dust and fume control systems. From the time engineers arrive to consult, to the moment skilled erectors leave . . . your work is in the hands of one experienced, reliable organization.

Write The Kirk & Blum Mfg. Co., 3028 Forrer Street, Cincinnati 9, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST AND FUME CONTROL

POWELL—a *trusted* name in flow control equipment

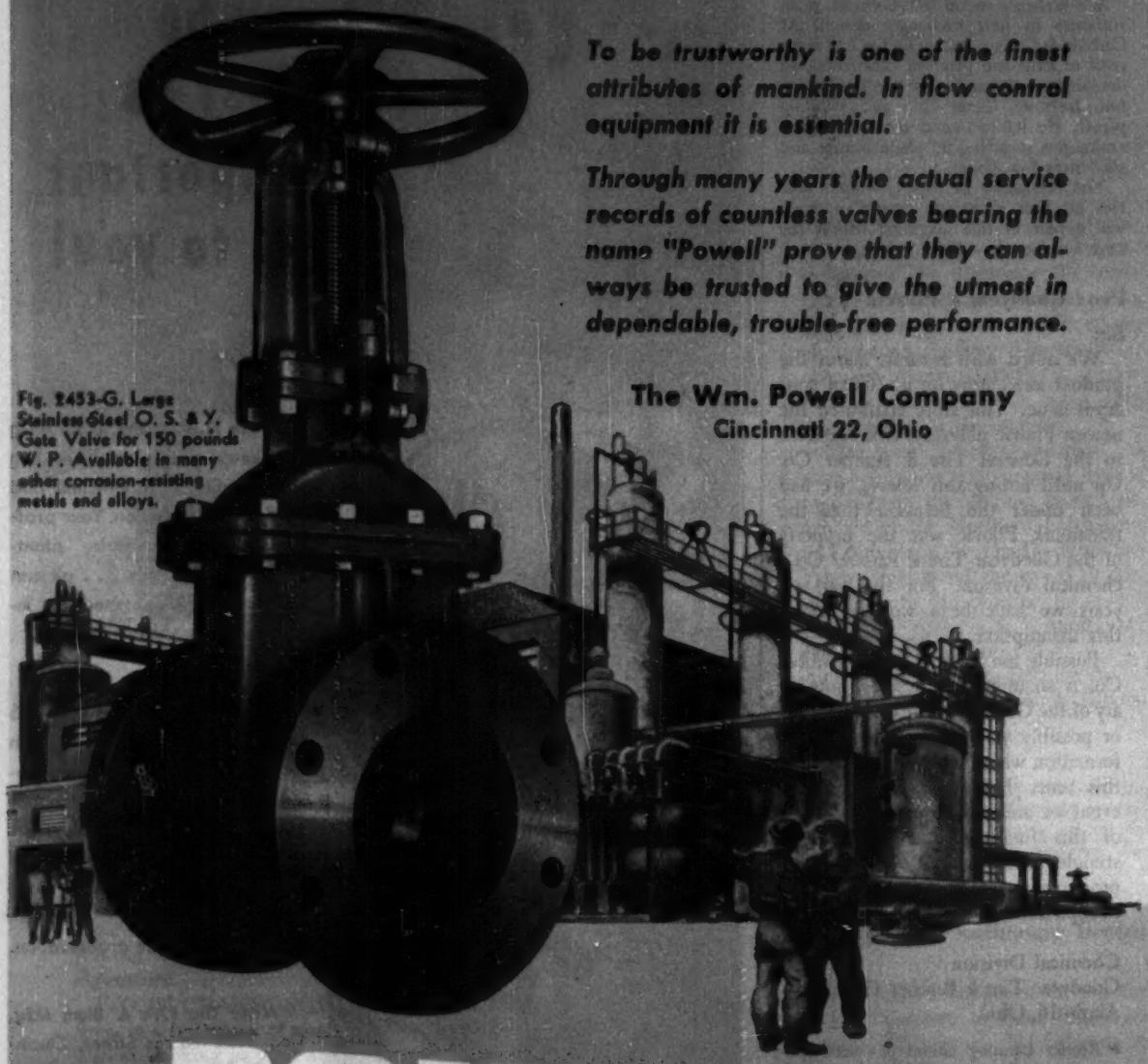


Fig. 2453-G. Large Stainless Steel O. S. & Y. Gate Valve for 150 pounds W. P. Available in many other corrosion-resisting metals and alloys.

To be trustworthy is one of the finest attributes of mankind. In flow control equipment it is essential.

Through many years the actual service records of countless valves bearing the name "Powell" prove that they can always be trusted to give the utmost in dependable, trouble-free performance.

The Wm. Powell Company
Cincinnati 22, Ohio

POWELL

Fig. 1876—Aluminum Gate Valve for 100 pounds W. P. at 350 F. Stem and solid, or split, wedge are Type 304 (18—8S Stainless Steel). Regularly furnished with integral seats but screwed-in Stainless Steel seat rings are available on order. Sizes: ¼" to 2", incl. Also with flanged ends.

Fig. 1801 — Liquid Level Gauge with flanged ends. Equipped with O. S. & Y. rising stem valves.

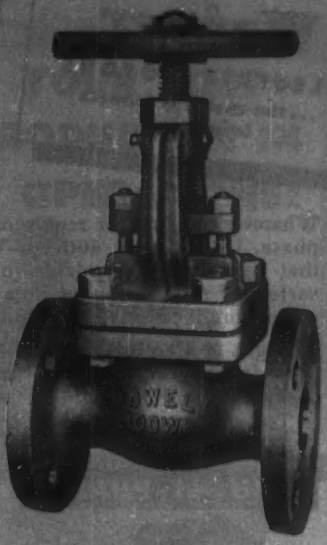


Fig. 2445—Aluminum O. S. & Y. Globe Valve for 100 pounds W. P. at 350 F. Stainless Steel stem is threaded and rises through bronze bushing in upper yoke. Composition disc. Regularly furnished with integral seat but screwed-in Stainless Steel seat ring is available on order. Sizes: ¼" to 3", incl. Also available with screwed ends.

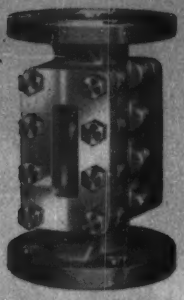


Fig. 2096 — Square Glass Sight Feed. Flanged ends. Designed and built for long service. Available in Bronze, Cast Iron, Steel and a variety of corrosion-resisting metals and alloys.

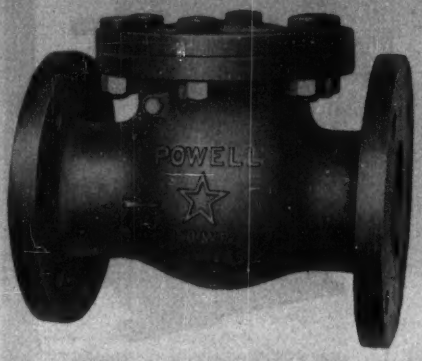


Fig. 2433 S. S.—Large size Stainless Steel flanged end Swing Check Valve for 150 pounds W. P. Bolted cap with body-cap bolts and nuts in stainless steel. Available in various other corrosion-resisting metals and alloys. Also made with screwed ends.

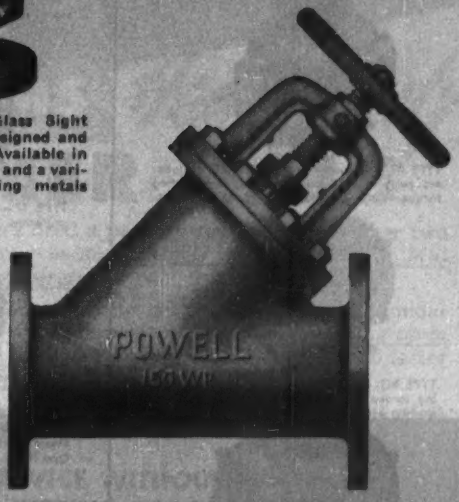


Fig. 1944—Large 150-pound "Y" Valve with bolted flanged yoke-bonnet and outside screw stem. Sizes 2½" to 12", inclusive. Available in a wide variety of corrosion-resisting metals and alloys.

DEPENDABLE VALVES SINCE 1848

VALVES

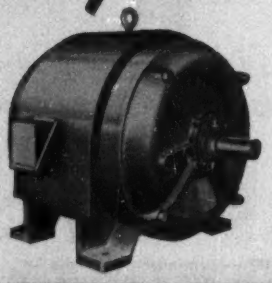
IN BRONZE, IRON, STEEL AND CORROSION-RESISTING METALS AND ALLOYS

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

Wagner Quality Motors *for your product or your plant*

Whatever your motor requirements may be—single-phase or polyphase, 1/125 hp or 400 hp—Wagner can offer a standard motor that is entirely dependable in its specific application. The wide variety of motors shown here is typical of the many motors and motor modifications in the complete Wagner line.

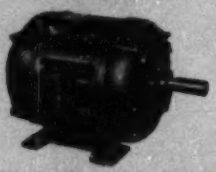
At right is TYPE RP—open type polyphase squirrel-cage motor. It is drip-proof and suitable for all general purpose applications. 1/6 to 400 hp.



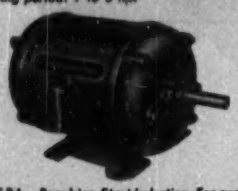
SINGLE-PHASE

TYPE RB—*Split-phase induction. For easy starting applications with high starting current. 1/20 to ½ hp.*

TYPE RK—*Capacitor-Start Induction. For general purpose applications requiring high starting torque—normal starting current. 1/6 to 5 hp.*

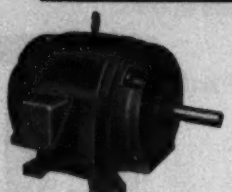


TYPE RG—*Repulsion-Induction. For high starting torque applications involving a very long starting period. 1 to 5 hp.*



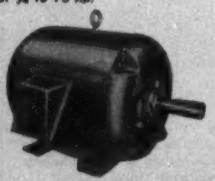
TYPE RA—*Repulsion-Start Induction. For general purpose applications with high starting torque—low starting current. ½ to 15 hp.*

POLYPHASE MOTORS



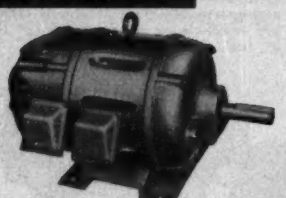
TYPE XP—*Splashproof. Protected against splashing or dripping liquids. ¾ to 200 hp.*

TYPE TP—*Totally-enclosed, non-ventilated. Fully protected. ¼ to 15 hp.*

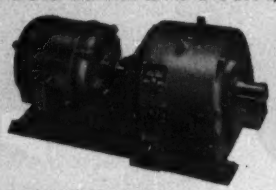


TYPE CP—*Totally-Enclosed Fan-Cooled. Protected against dirt, chips, abrasives or fumes. Steel frame. 1 to 250 hp. Also in explosion proof type HP.*

TYPE EP—*Corrosion-resistant Totally-Enclosed Fan-Cooled. Cast iron frame. 2 to 250 hp. Also available in explosion proof type JP.*



TYPE RS-1—*Wound Rotor. Constant or adjustable varying speed. 1 to 250 hp. TYPE RS-2 for intermittent service. 2 to 200 hp.*



GEAR MOTORS—*Single-phase or Polyphase. Open or enclosed types. 1/20 to 50 hp.*

* * *

In addition to a complete line of motors, Wagner also furnishes Increment Type Motor and Starter Combinations, Jet Pump Motors and a complete line of Transformers: Dry-type, Distribution and Power. Wagner engineers welcome an opportunity to serve you. Consult the nearest of our 32 Branch offices, or write direct.

Wagner Electric Corporation EST. 1891

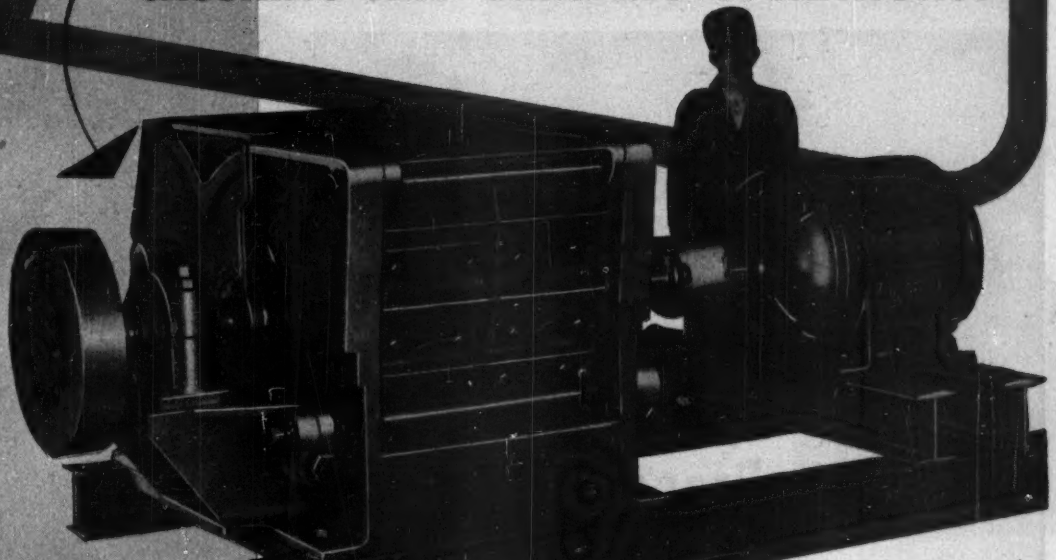
WAGNER ELECTRIC CORPORATION
6407 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS • AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M53-14

LOWER YOUR COST—
INCREASE YOUR PRODUCTION IN
CRUSHING AND GRINDING OPERATIONS!



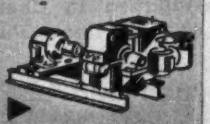
OTHER WILLIAMS EQUIPMENT

ROLLER MILLS
—IMPACT and DRYER MILLS
—for fine grinding to 400 mesh or micron sizes

AIR SEPARATORS
—any type; for precision control and high production in fine grinding

VIBRATING SCREENS
—in any size for any job. 1 to 3 decks, open or enclosed.

HELIX-SEAL MILLS
—for dust-free grinding, and for wet, sticky, greasy materials.



Also: COMPLETE "Packaged" PLANTS for crushing, grinding, separating.

WILLIAMS *Heavy Duty*

HAMMER MILLS

With a Williams, you don't need a primary crusher and another two or more secondary grinders—because *a single Williams Hammer Mill does the complete job in one operation!*

That means no additional machines are necessary—no extra foundations, housing, conveyors, drives or other equipment—*a saving up to 75% on initial investment!* And because a Williams does the job faster and better, you can *cut your crushing costs up to 50%!*

There's a Williams to suit *your* specific need, no matter what it is! It will pay you to *get the facts now!*

AT YOUR SERVICE WITHOUT COST—
WILLIAMS TESTING LABORATORY

Whatever your material or product, Williams will help you solve your grinding, crushing or shredding problems without charge or obligation. Just bring or send a sample of your raw material and describe the results you want. Williams Equipment is now being used for the reduction, sizing and separation of virtually every type of chemical, mineral, vegetable or animal matter with greater speed and economy.

WILLIAMS PATENT CRUSHER AND PULVERIZER CO.
2707 North Broadway St. Louis 6, Mo.

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

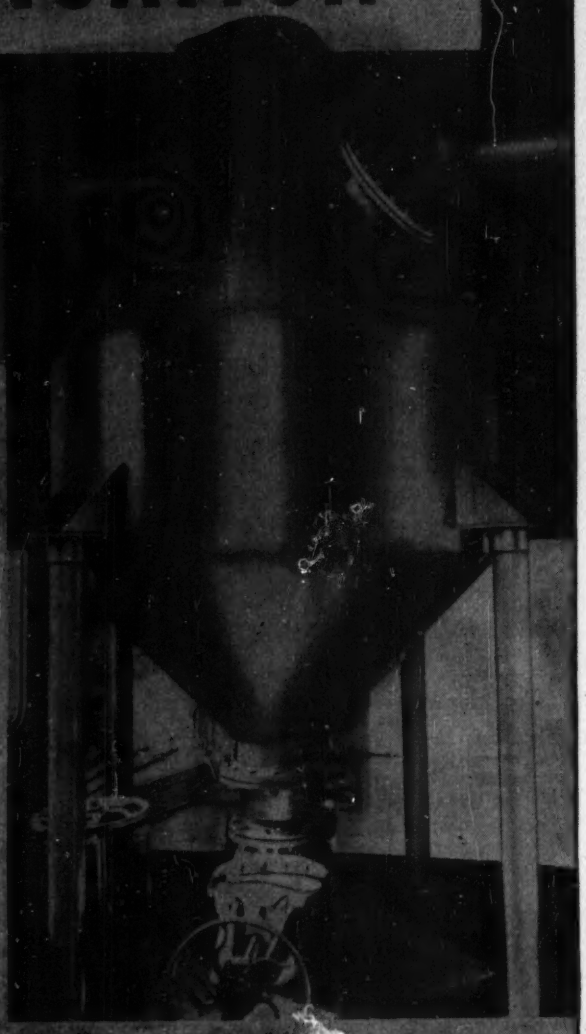
GAS PURIFICATION

AT REDUCED COST

Catalytic Operation at Low Pressure

DEOXO GAS PURIFIERS

- No Maintenance Cost
- No Operating Cost
- No Reactivation



Typical Installation in Chemical Plant—150,000 CFH Deoxo Purifier

At Room Temperature—Removal of Oxygen and/or Hydrogen

At 100° Centigrade—Conversion of CO to CO_2

At 200° Centigrade—Methanation of CO to CH_4

Available in Capacities of 25 CFH to 200,000 CFH

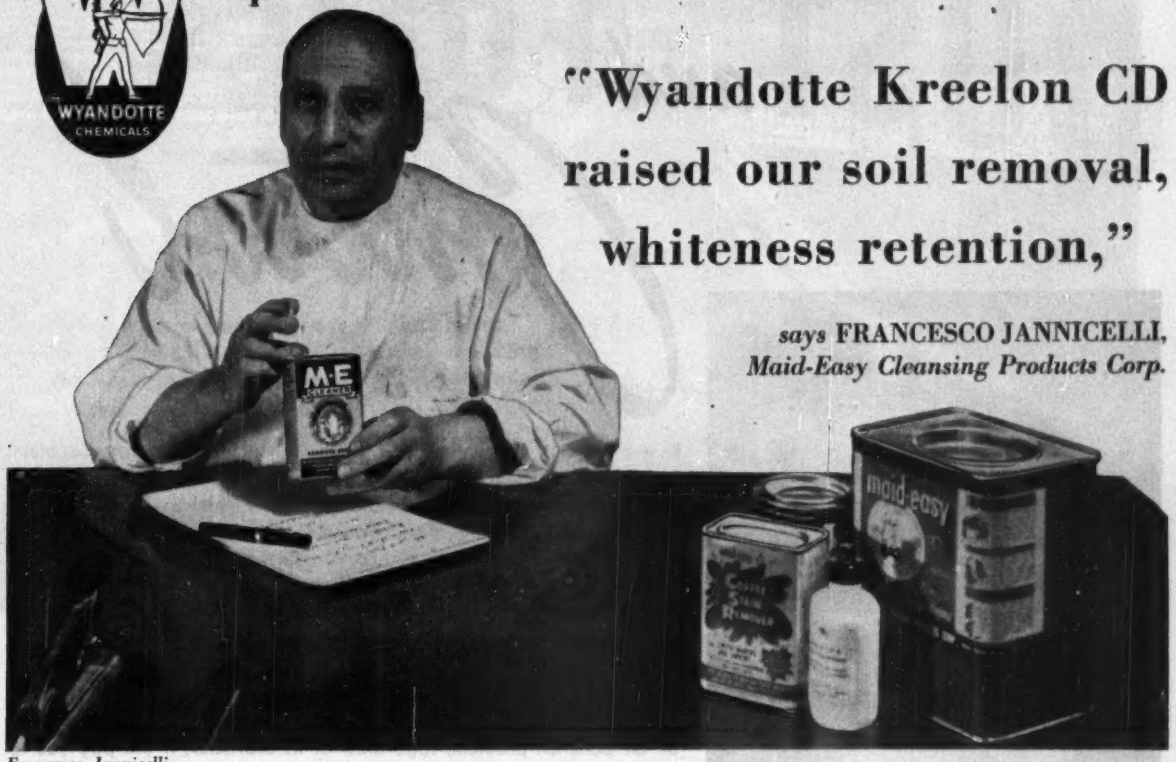
Baker & Co., Inc.

113 ASTOR ST., NEWARK 5, N. J.

Dependable Source of Raw Material Chemicals

"Wyandotte Kreelon CD raised our soil removal, whiteness retention,"

says **FRANCESCO JANNICELLI,**
Maid-Easy Cleansing Products Corp.



Francesco Jannicelli

"We have used many alkylarylsulfonates," says Mr. Jannicelli, president of Maid-Easy Cleansing Products Corp., Mount Vernon, N.Y., "and have never had as good results as we have obtained with Wyandotte Kreelon CD.

"This Wyandotte product combines the advantages of a synthetic detergent and a detergent-promoter in one, and it gives us a better, more uniform finished product that is easy on the hands.

"We are so pleased with the advantages to us — savings in storage space, reduced handling and mixing time, and improvements in soil removal against the products we previously used — that we have switched over a great many of our compounds to a Kreelon CD base."

Have you tried Wyandotte KREELON* CD? Not only does its emollient characteristics reduce skin irritation, but KREELON CD's detergency offers a 20-70% improvement in soil removal and whiteness retention properties.

Also, do you know about Wyandotte's new KREELON 8D and 8G which offer better economy and greater solubility than other high, active-agent detergents? Both of these products have improved whiteness-retention properties and are ideal for commercial laundry and household formulations.

Let us send you a sample and data on Wyandotte KREELON. Mail coupon today, or write for helpful technical assistance. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

*REG. U.S. PAT. OFF.

Wyandotte CHEMICALS

Headquarters for ALKALIES

Wyandotte Chemicals Corporation, Dept. CE, Wyandotte, Michigan

Send for free literature on: ☐ Kreelon 4D Flake, ☐ 4G Powder (40% active agent)
☐ Kreelon 8D Flake, ☐ 8G Powder (85% active agent)
☐ Kreelon CD (Promoted Syndet)

Send sample quantity of: Kreelon 4D ( ), 4G ( ), 8D ( ), 8G ( ), CD ( ), for use in:

Name_____ Title_____

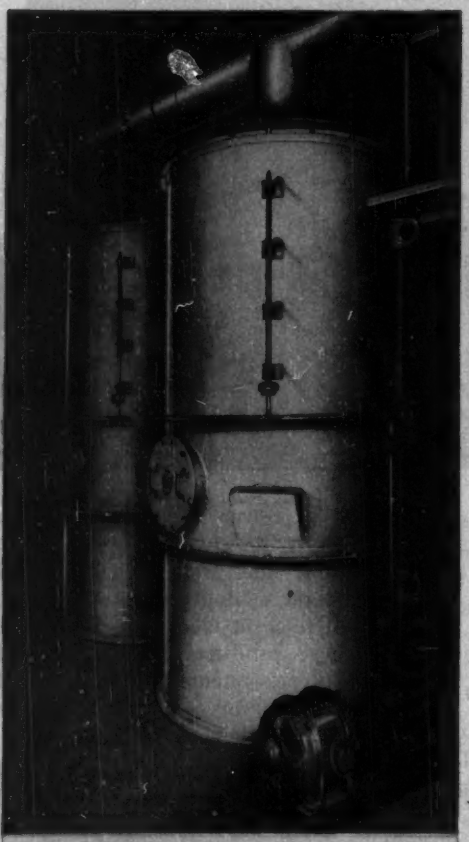
Firm Name_____

Address_____

City_____ Zone_____ State_____

DUST and FUME Control

Special equipment engineered to solve individual problems posed by dusts of all kinds, fly ash, chemical fumes, gases of any temperature, aerosols, and other troublesome air polluents



MAHON FOG-FILTERS AT WORK

The installation illustrated above was specially designed for the Meter State Oil & Grease Co., Jackson, Mich. PROBLEM: To eliminate H_2S odor from sulphonated grease manufacturing operations. The problem was complicated by grease and oil fumes present in H_2S gas. SOLUTION: A two-tower Fog-Filter connected in series was designed with high pressure water fog collecting practically all of the grease and oil fumes in the first tower. A caustic solution employed in the second tower and fogged at lower pressure removes the remaining H_2S from the air before it is exhausted into the atmosphere.

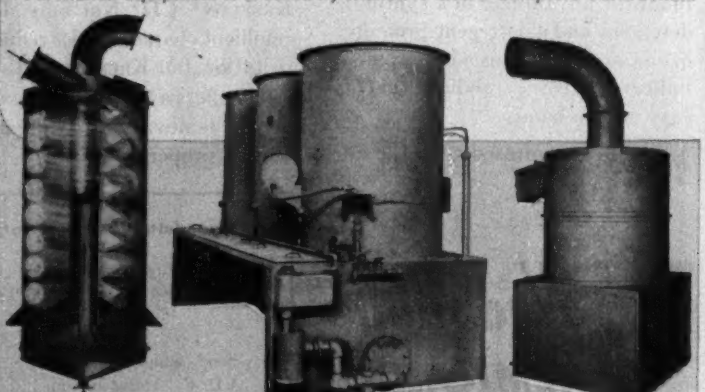
In dealing with air contaminants, each individual air cleaning problem must be approached with a view to determining what type of collector or filter is required to produce maximum results under existing conditions. Study and analysis of the character and extent of the polluent is therefore imperative in arriving at a satisfactory solution. Mahon dust and fume control engineers have, over a period of years, developed and perfected special Wet and Dry Collectors and Fog-Filters which have proved highly successful in coping with all types of industrial air contaminants—a few are illustrated here . . . they are serving today in some of the most difficult and mandatory air cleaning jobs in industry. Each installation has been engineered to do the specific job. If you have an air pollution problem, regardless of its character, it will pay you to call in a Mahon engineer and let him show you what Mahon equipment has done with like polluents under conditions comparable to your own. See Mahon's Insert in Sweet's Mechanical Industries File for further information, or write for Industrial Equipment Catalog A-653.

THE R. C. MAHON COMPANY

Main Plant and Home Office, Detroit 34, Michigan

Engineers and Manufacturers of Dust and Fume Control Equipment Including Cyclone Collectors, Hydro-Foam Collectors, Jet Trap Collectors, Hydro-Filter Collectors, and Fog-Filters and Cupola Stack Washers.

All Mahon Equipment is Erected by Mahon to Insure Complete Satisfaction.



Fog-Filter **Hydro-Foam Dust Collector** **Jet Trap Dust Collector**

MAHON

Salt evaporating pan hood and stack of corrosion-resisting Monel. Fabricated by the Brown-Hutchinson Iron Works of Detroit, Michigan, of 26-gauge Monel sheet, 16-gauge ribs and ⅛" x 1" x 1" angle supports, it is 16' high by 44' wide overall . . . Monel throughout.

Protecting product purity with MONEL

Is corrosion putting the bite on your equipment?

Is it endangering your product purity?

Then you'll be interested in this experience of a large midwestern company.

Producing highly refined salt for the food processing industry, they needed a special material for new brine evaporating pan hoods.

They needed a material that was highly resistant to corrosion . . . because . . . corrosive salt vapors condensing on a non-resistant hood would carry heavy metal impurities back into the slurry, thus contaminating the salt.

And they needed a material that had special fabrication features. It had to have the same high corrosion resistance in weld areas as in the sheet itself.

These requirements, plus their experience with Monel® in heat exchangers, dryers, and conveyors, led them to select Monel again.

They now have four hood assemblies in use, giving excellent service in the production of a high quality salt . . . thanks to Monel.

* * *

So, if you are bothered by corrosion or have difficulty maintaining purity of product, perhaps Monel offers you a solution, too. Consult our technical staff. They will be glad to help you. Just write giving full details.

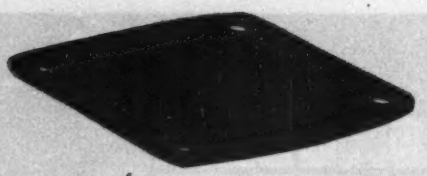
Remember, however, that because Nickel and Nickel Alloys like Monel are on extended delivery, it will pay you to anticipate your needs. Order well in advance giving necessary NPA rating and complete end-use information.

THE INTERNATIONAL NICKEL COMPANY, INC.

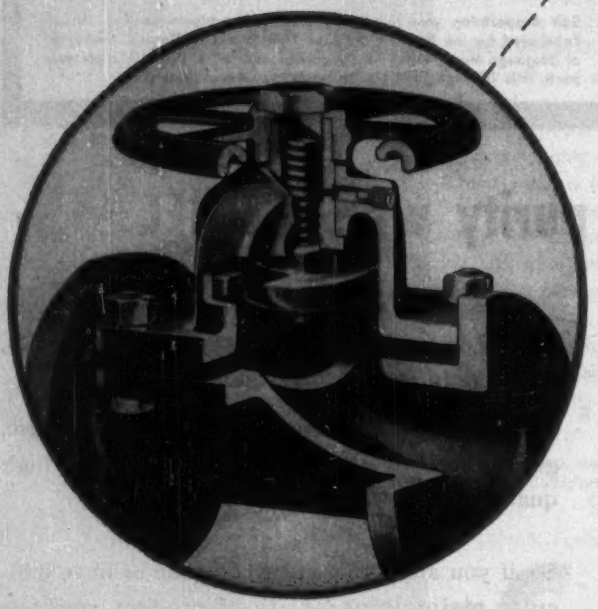
67 Wall Street, New York 5, N. Y.

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL • "S"® MONEL
NICKEL • LOW CARBON NICKEL • DURANICKEL®
INCONEL® • INCONEL "X"® • INCOLOY® • NIMONICS

Nickel INCO Alloys



Diaphragm of Du Pont "ALATHON" Handles 98% Sulfuric Acid



Valve manufactured by
Hills-McCanna Co., Chicago

Tough part withstands repeated flexing . . . protects valve mechanism . . . cuts costs

In adapting its Saunders Patent diaphragm valve for handling corrosive fluids—particularly 98% H_2SO_4 heated to 125°F. at 100 psi—the Hills-McCanna Company required a diaphragm material that would stand up under flexure as well as chemical attack. Materials that could resist the chemicals would fail mechanically after short use.

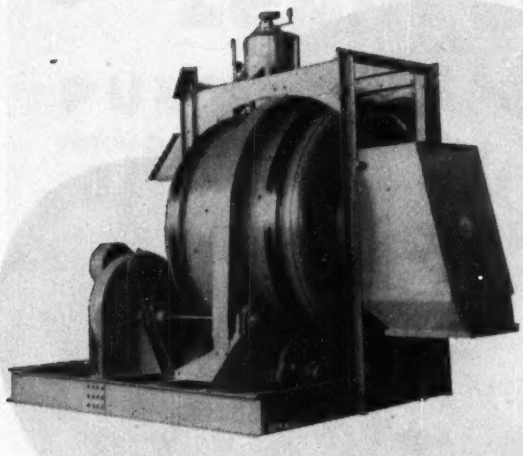
The answer proved to be a diaphragm molded of Du Pont "Alathon"* polyethylene resin. "Alathon" is tough, resilient. Its strength and low rate of water absorption (< 0.01%) permit it to withstand flexing under abnormal conditions. It resists chemical attack. It prevents leakage and sticking . . . protects the valve mechanism from corrosive fluids and fumes. In use, diaphragms made of "Alathon" have meant fewer failures, lower operating and maintenance costs, less down time, increased production.

Perhaps Du Pont "Alathon" can help you improve or develop a product. "Alathon" has a unique combination of properties providing improved performance in varied chemical, mechanical and electrical applications. For full information on "Alathon" and other members of the Du Pont family of plastics engineering materials, write: E. I. du Pont de Nemours & Co., (Inc.), Polychemicals Department, Room 257 Du Pont Building, Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY
Polychemicals
DEPARTMENT
PLASTICS • CHEMICALS

He can't stand that slow mixing cycle!



THE MODERN WORTHINGTON CHEMICAL MIXER is available in sizes up to 110 cu ft or 3 tons per batch. Each mixer is equipped with a measuring tank for various chemical applications.

But it isn't *that* bad, friend. Give us a chance to help. We've got a mixer that can boost your daily output as much as 10 per cent. It's the Worthington chemical mixer with an engineered blade design that gives you a mixing action faster than any we know of. It saves time with every batch, can be set up for continuous agitation, mixes thoroughly, and eliminates these other big problems as well:

CORRODED DISCHARGE CHUTE—The Worthington discharge chute is out of the mixer during mixing time. Proper balance makes manual control of chute easy. Pneumatic controls are also available.

WOBBLY DRUM ROLLER—Worthington drum rollers are of genuine carwheel metal, ground to close tolerances. Drum roller shafts are easily adjustable to compensate for wear.

HEAVY HORSEPOWER CONSUMPTION — Worthington's specially engineered, anti-friction construction assures peak operating efficiency with lowest possible horsepower consumption.

YR.3.2

WORTHINGTON

Industrial Mixers

SEND THIS COUPON TODAY to learn more about how to reduce mixing time and cost with a Worthington chemical mixer. There's a skilled Worthington engineer near your plant. At your request, he'll be glad to call on you.

Worthington Corporation
Industrial Mixer Division
Plainfield, New Jersey

B

Name.....

Position.....

Address.....

City.....Zone.....State.....

☐ I'd like more information. ☐ I'd like to talk with an engineer.

what's overhead won't worry you...

YOU'RE SAFE WITH THE

NEW SUPER-TOUGH

WILLSON SAFETY HAT

THE NEW WILLSON SAFETY HAT gives you effective, comfortable head protection in areas of overhead hazards. It is entirely new in design, material and method of manufacture . . . tough as metal and more resilient! It has been field-tested for over two years. Here are some other outstanding features of the new Willson Super-Tough* Safety Hat . . .

streamlined contour—deflects objects more effectively and provides a greater safety "pocket" inside.

new suspension design—adjustable "hammock" headband is suspended *inside* at 6 points. No exposed rivets or lacing—no holes through hat.

comfortably cool—space between headband and shell provides ample air circulation for wearer.

moisture resistant—practically 100% waterproof and resists many caustics and acids.

Passes all required tests with an extra margin of safety!

More than 300 Safety Products Carry This Famous Trademark

WILLSON

Established 1870

Write for your copy of the new bulletin describing the Willson Super-Tough* Safety Hat.

*Trademark

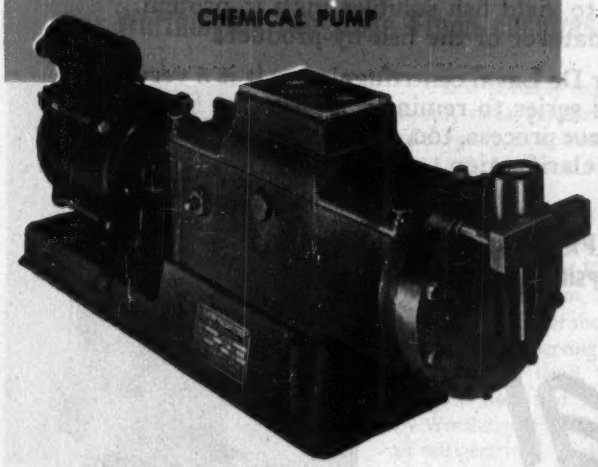
WILLSON PRODUCTS, INC., 106 Washington Street, READING, PA.

THESE FLUIDS ARE DIFFICULT TO PUMP

ACETALDEHYDE
ACETONE
FORMALDEHYDE
FREON
MERCAPTANS
MERCURY
MOLTEN METALS
NAPHTHALENE (Molten)
NITRIC ACID
PHOSPHORIC ACID
SODIUM CYANIDE
SULFUR DIOXIDE
TRINITROCHLOROBENZENE
VINYLIDENE CHLORIDE
CHLOROSULFONIC ACID
CHROMIC ACID
HYDROBROMIC ACID
NITRIC ACID
OLEUM
OXALIC ACID
PROPIONIC ACID
SULFURIC ACID
IODINE
BENZOLCHLORIDE
BENZOLTRICHLORIDE
LIQUID BROMINE
CHLORACETIC ACID
DILUTE ACIDS
ALUMINUM SULFATE
DIATOMACEOUS EARTH SLURRY
FERRIC SULFATE
SODIUM HYPOCHLORITE
SALT SOLUTIONS
SODIUM SILICOFLUORIDE
HYDROGEN PEROXIDE
HYDROCHLORIC ACID
BROMINE TRIFLUORIDE
CHLORINE
CHLORINE TRIFLUORIDE
FLUORINE GAS
HYDROFLUORIC ACID
HYDROGEN CYANIDE
HYDROGEN FLUORIDE
FLUORINE
SULFUR DICHLORIDE

THEY ARE HANDLED SUCCESSFULLY BY THE Lapp PULSAFEEDER

PISTON-DIAPHRAGM CONTROLLED-VOLUME CHEMICAL PUMP



Not competitive with any pump of more conventional design, the Lapp PULSAFEEDER is a highly specialized, precision, custom-built machine suited to a wide variety of special applications involving controlled-volume pumping of fluids.

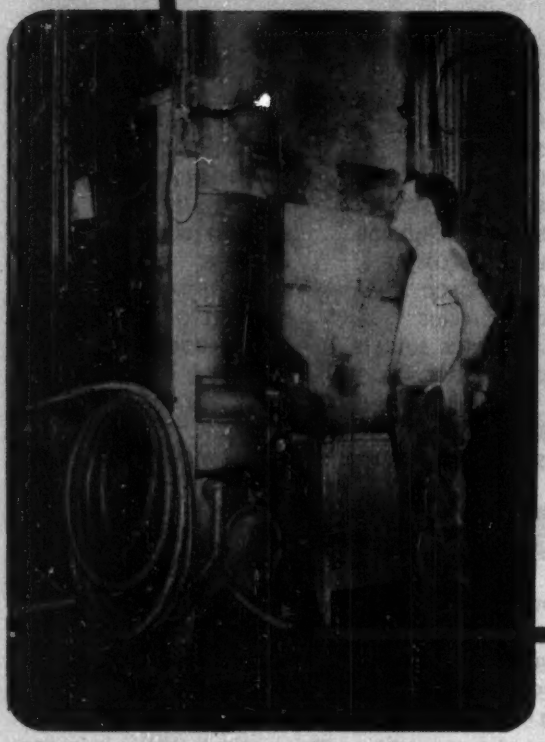
Basic feature of Lapp PULSAFEEDER design is its combination of reciprocating piston action (to provide the accuracy of positive displacement) with an hydraulically balanced diaphragm which isolates material being pumped from working pump parts—and, of course, eliminates need for stuffing box or running seal.

Control of pumping rate is achieved at constant pumping speed; variable flow results from variation in piston stroke length—adjustable by hand-wheel, or, in Auto-Pneumatic models, by instrument air pressure responding to any instrument-measureable processing variable.

Justification for this specialized premium construction is evident in the many, and varied, applications in which Lapp PULSAFEEDER alone is able to perform satisfactorily. In fact, the economies of continuous processing, automatic proportioning, feeding and filling in many operations are possible only because of the unusual characteristics and peculiar advantages of Lapp PULSAFEEDER.

In general, use of the Lapp PULSAFEEDER is indicated for continuous (or intermittent) pumping, at accurately controlled volume, of fluids which cannot be satisfactorily exposed to conventional pistons, cylinders and stuffing box packing—because of the corrosive action of chemicals being handled and/or need for protection of product against contamination.

Lapp Bulletin 300 shows typical applications and flow charts. It describes and lists specifications of models over a wide range of capacities and special constructions. Also included is an Inquiry Data Sheet, from which we can make specific engineering recommendations for your processing requirement. For your copy write Lapp Insulator Co., Inc., Process Equipment Div., 110 Wilson St., Le Roy, N.Y.



Everything Is Centrifuged But The Smell!

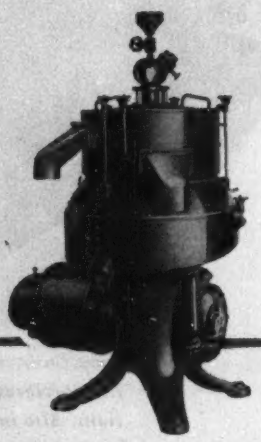
The Operation...
Oil From Fish Meal

The De Laval "Nozzle-Matic"® Separator shown here is recovering the oil from fish press liquor. The machine is a three-way centrifugal, designed to run for long periods without the necessity of stopping for bowl cleaning. Most of the solid particles (that would clog the bowl of a two-way centrifuge) discharge through nozzles along with a portion of the heavy liquid.

The stick water from the water discharge of the centrifuge is further processed by means of evaporators to yield fish solubles high in protein. Thus there is virtually no waste whatever of the fish by-product!

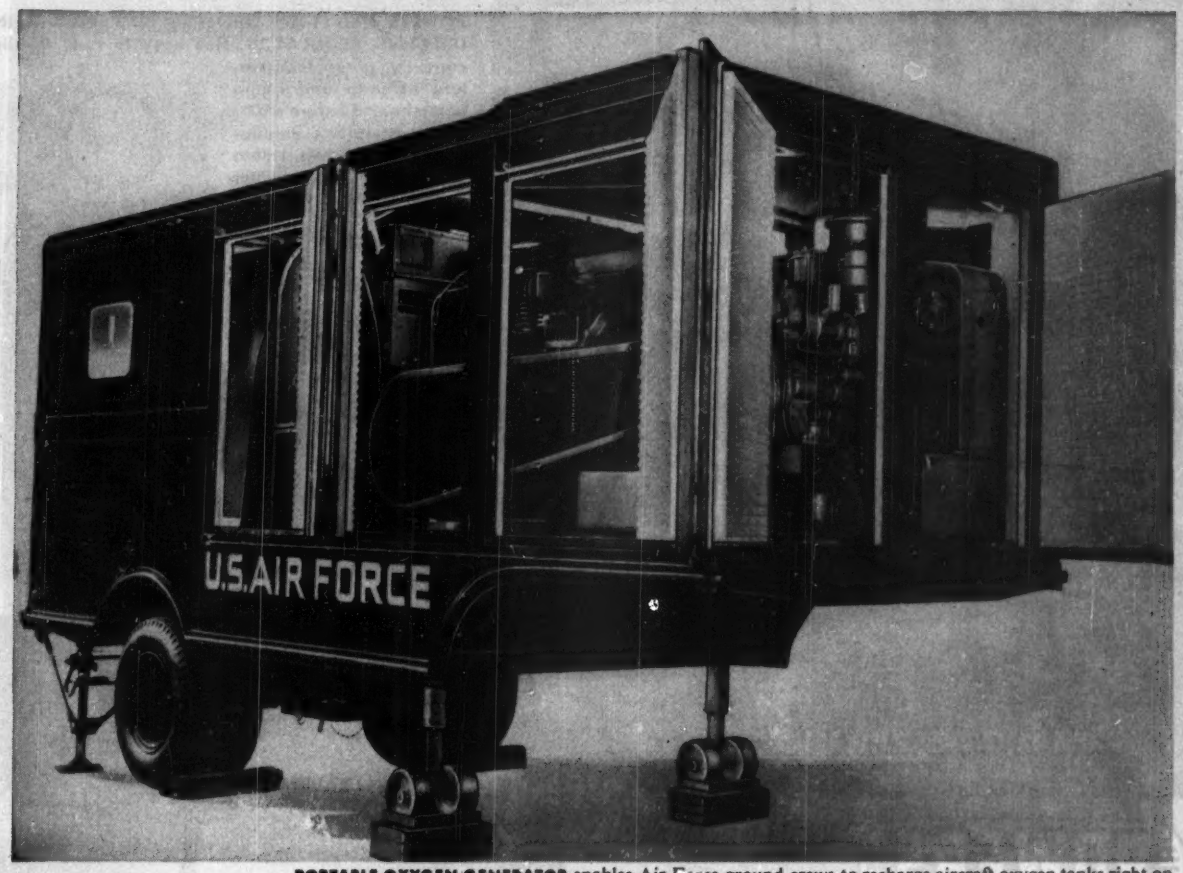
This is not a new application for De Laval centrifugals but it is a very effective one. It is included in this series to remind you that De Laval engineers may be able to speed up *your* process, too, if you have a problem involving continuous separation or clarification.

THE DE LAVAL SEPARATOR COMPANY
Chicago POUGHKEEPSIE, N.Y. San Francisco



De Laval

FOR FASTER PROCESSING SYSTEMS



PORTABLE OXYGEN GENERATOR enables Air Force ground crews to recharge aircraft oxygen tanks right on the field. Previously, it was necessary to ship oxygen from central plants, sometimes for great distances.

Portable oxygen supply for the Armed Forces

Worthington two-stage Freon compressor used in mobile oxygen generator

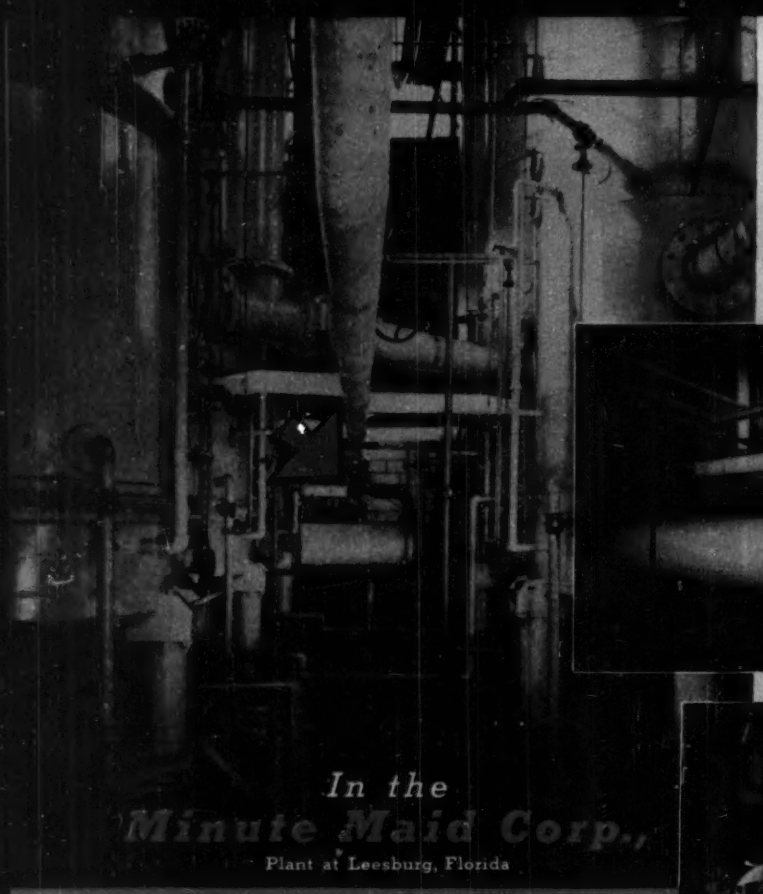
A new portable oxygen generator, produced by Air Products, Inc., of Allentown, Pennsylvania, supplies our armed forces with oxygen in the field. A dependable supply of oxygen is an absolute necessity to our fliers, medical corpsmen, and engineers. Both the U. S. Air Force and the U. S. Army have accepted this mobile unit as standard equipment.

A major component of the oxygen generator is a Worthington two-stage, 15-hp Freon refrigeration compressor. This compact unit makes it possible to cool atmospheric air to minus 65 degrees F. After compression, the air is liquefied and then separated into oxygen and nitrogen. The nitrogen is used when needed as a fire blanket in fuel tanks.

Since the turn of the century, Worthington air conditioning and refrigeration equipment has been serving the armed forces, business, and industry—meeting any assignment, large or small. Worthington systems are all Worthington-*made*, not just Worthington-assembled. In addition to getting a perfectly balanced system, users benefit by Worthington's complete unit responsibility. So when you think of air conditioning or refrigeration—think of Worthington. Get in touch with your nearest Worthington district office, or write Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.3.39, Harrison, New Jersey. A.3.39

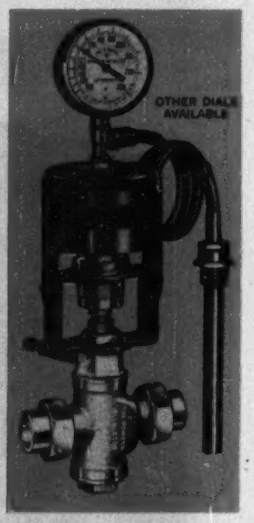
Climate Engineers to Industry, Business and the Home

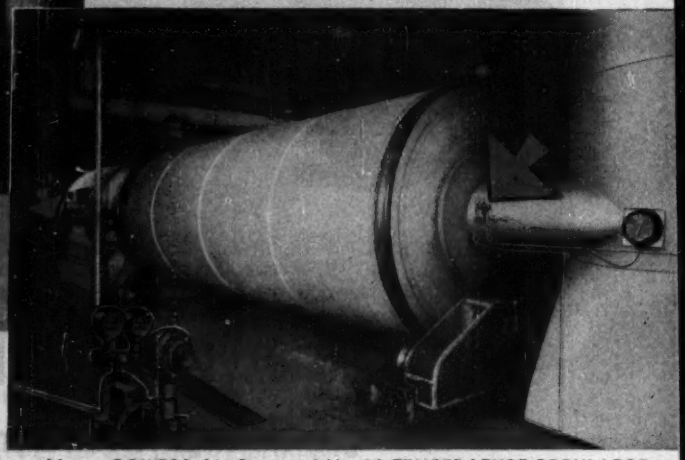
WORTHINGTON



In the
Minute Maid Corp.,
Plant at Leesburg, Florida

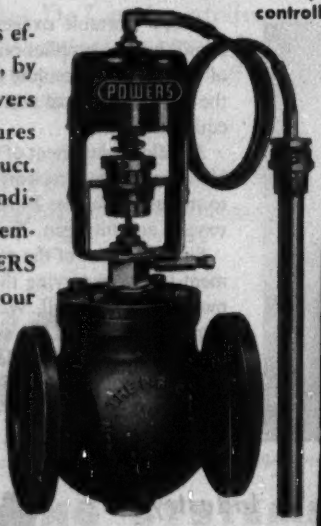
POWERS No. 11 Self-Operating TEMPERATURE INDICATING REGULATOR. Has easy to read 4" dial correctly gives temperature of pulp and liquid being heated before entering evaporators. Regulator valve controls steam supply to large heater shown below.

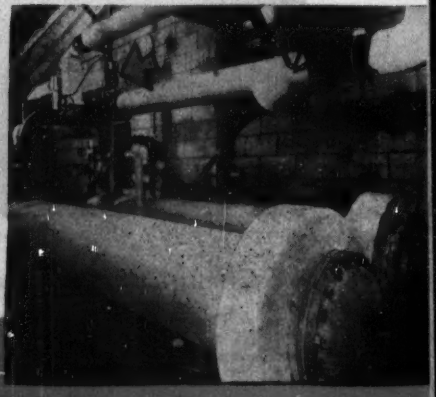




Above: POWERS Air Operated No. 10 TEMPERATURE REGULATOR controlling valves on Oil Burners and Dampers of HEIL CO. ROTARY DRYER.

Below:
POWERS No. 11 Self-Operated TEMPERATURE REGULATOR automatically controlling steam supply to large double cylinder heater.





POWERS **TEMPERATURE CONTROL**

Helps Regulate Processing of Citrus Fruit By-Products for Animal Feeds

FUEL and LABOR SAVINGS are obtained in this efficiently managed plant of the Minute Maid Corp., by preventing losses of OVER-heating with Powers automatic control. Constant uniform temperatures also help to produce a more uniform quality product.

If you want to maintain any process or air conditioning equipment at a more constant uniform temperature or humidity, contact your nearest POWERS office for help in selecting the right control for your requirements.

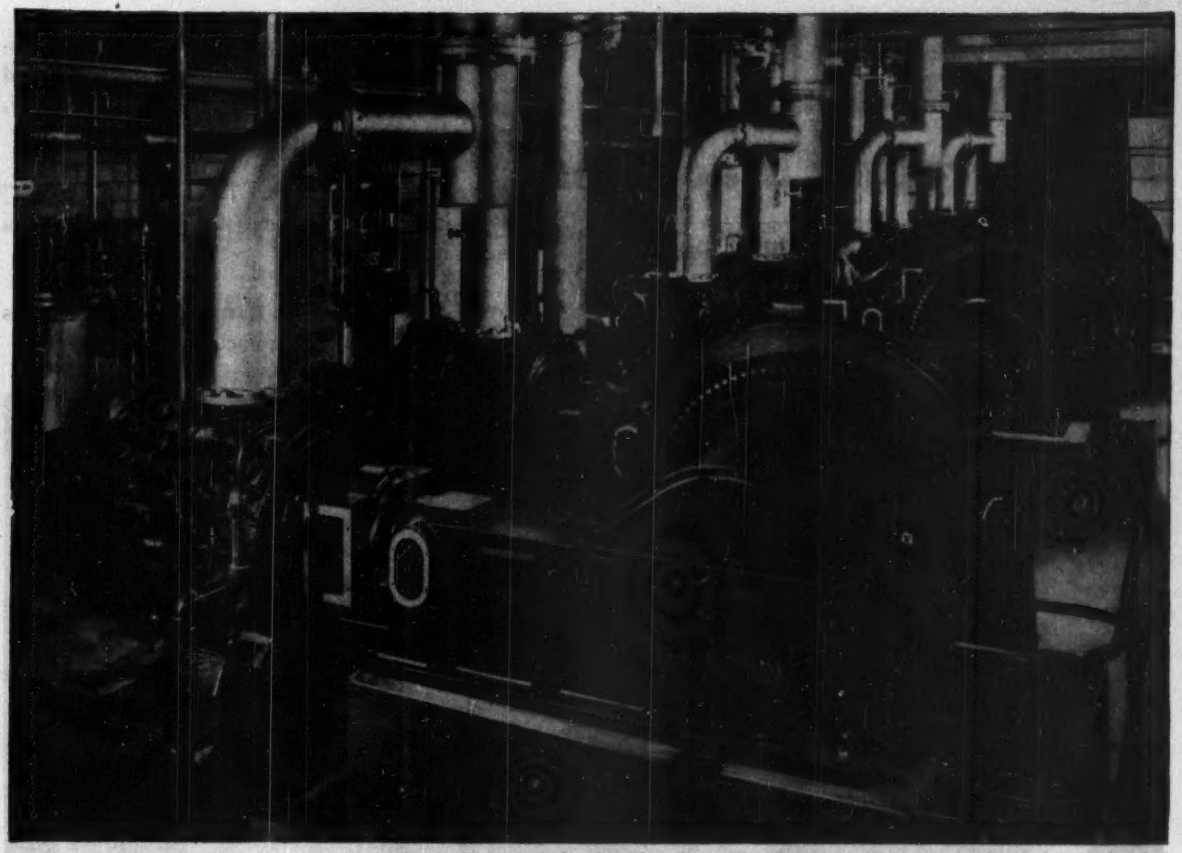
With almost 60 years of experience and a wide variety of pneumatic and self-operated regulators POWERS engineers are well qualified to help you get the most value for your money. Phone our nearest office or write—

(MMC)

THE POWERS REGULATOR CO.

OVER 59 YEARS OF AUTOMATIC TEMPERATURE CONTROL • OFFICES IN OVER 50 CITIES • SEE YOUR PHONE BOOK

CHICAGO 14, ILL., 2720 Greenview Ave. • NEW YORK 17, N.Y., 221 E. 46th St. • LOS ANGELES 5, CAL., 1060 W. Eight St. • TORONTO, ONT., 193 Spadina Ave.



AIR IS BLOWN INTO KILNS by these four large Worthington compressors at a Pennsylvania chemical plant. Air pressure must be increased to overcome gradual deposit build-up; when compressor discharge reaches 30 lb. psig, kiln is shut down for cleaning.

Chemical plant gets oil-free compressed air for making important paint ingredient

To manufacture phthalic-anhydride, an essential ingredient in paint, a Pennsylvania chemical company needed compressed air with *no trace* of oil.

Four Worthington *non-lubricated* compressors were specified, and according to the plant managers, they have filled the bill.

Why many plants specify Worthington

Engineering-wise industrial plants of all kinds are specifying Worthington compressors for reliable, low-cost compressed air. They're getting it because of such Worthington features as:

- *The exclusive Feather* Valve*—simplest, lightest, most efficient valve ever made.
- *High efficiency intercooler*—needing less water, less power, less attention.
- *Automatic variable capacity control*—most accurate and flexible obtainable.

Your engineering problem may call for non-lubricated or lubricated compressors . . . high or low capacity . . . high or low pressure . . . single- or two-stage . . . horizontal or Y type . . . gas or air compression. Whatever it is, for help in solving it write to Worthington Corporation, Compressor Division, Buffalo 5, N. Y.

*Reg. U. S. Pat. Off.

K.2.4

No Other Compressor Will Outperform a Worthington

WORTHINGTON

Compressors

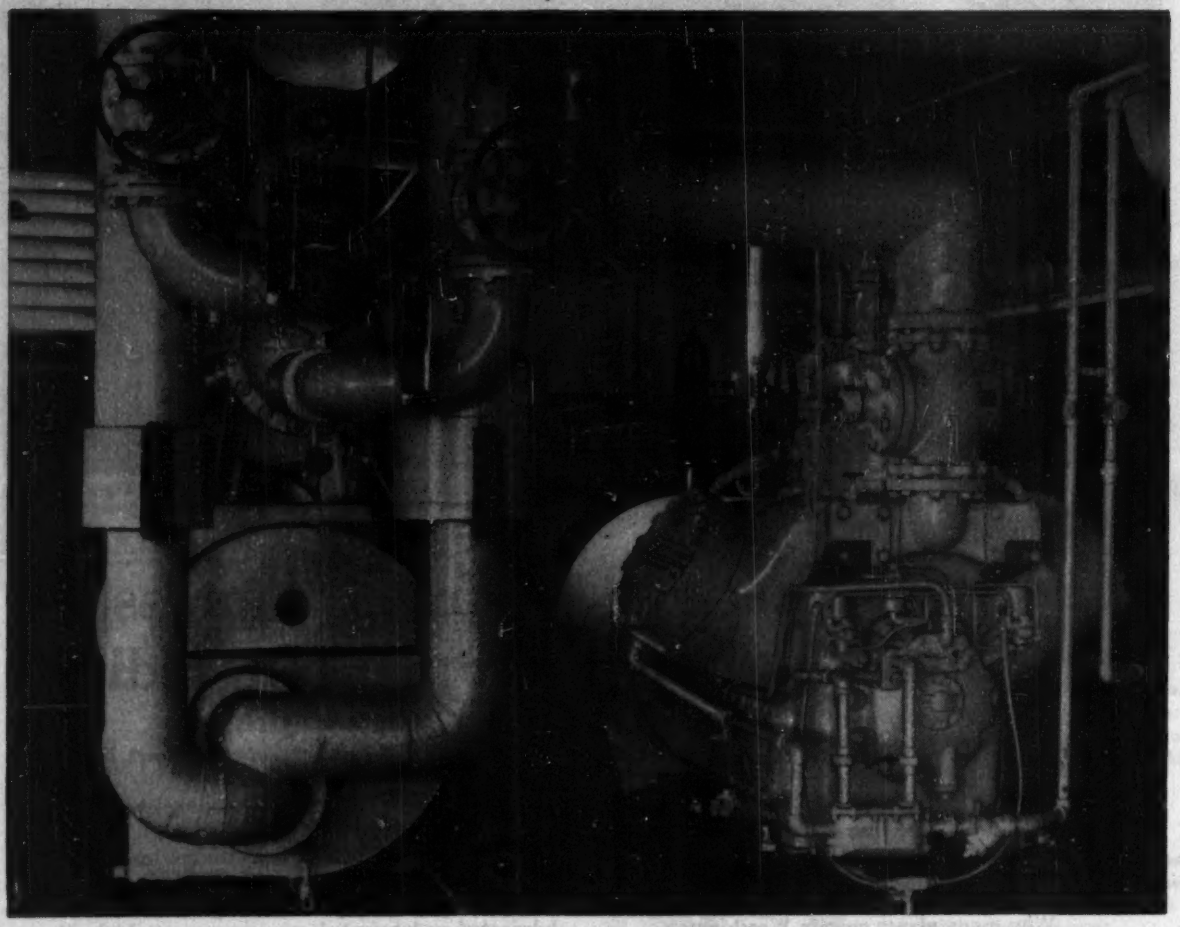
Carrier Reciprocating Refrigerating Machines

100 and 150 hp units are "packaged" to save you days and dollars

Why pay more? The Carrier "package"—compressor, cooler, condenser, piping, valves, controls and accessories—actually costs less than separately purchased components. Costs less to install, too.

Why bother with parts? The Carrier "package" is complete from foundation drawings to gauges and safety controls.

Why risk delays? The Carrier "package" comes complete from one manufacturer at one time.



Why pay for waste? The Carrier "package" contains only the amount of pipe necessary to do the job, fittings already selected.

Why settle for unmatched components? The Carrier "package" is completely co-ordinated in design.

Why split responsibility? The Carrier warranty covers the whole machine.

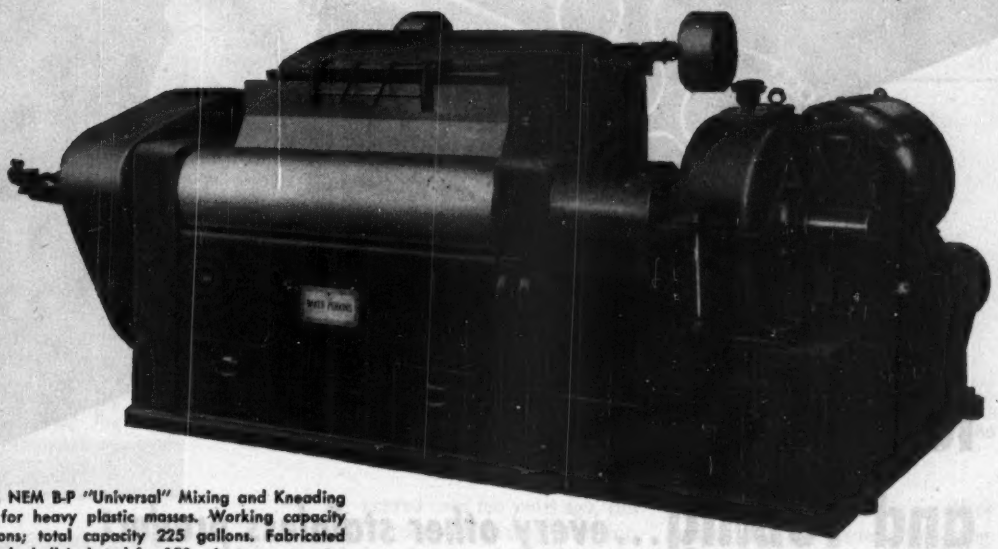
Why wait? Write today for booklet, "100 and 150 hp Reciprocating Refrigerating Machines." Carrier Corporation, Syracuse, New York.

Carrier

air conditioning
refrigeration
industrial heating

BAKER PERKINS mixers will thoroughly mix and knead almost any material for the chemical processing industry

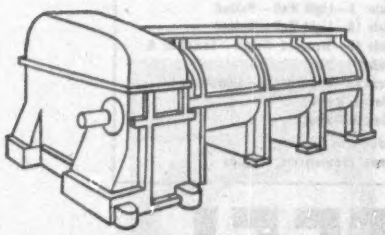
There is a BAKER PERKINS Mixer built to efficiently mix and knead materials ranging in consistency from dry powders and light fluids to stiff plastic masses. Close clearance between the blades and trough keep every particle of the material in constant motion so that no part of the batch escapes the thorough mixing action of the blades. Intensive kneading is maintained as the material is pulled and squeezed against the blades, saddle and sidewalls. Consult a B-P sales engineer for full facts.



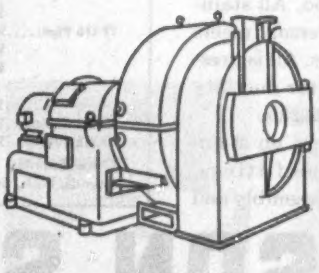
SIZE 16, NEM B-P "Universal" Mixing and Kneading Machine for heavy plastic masses. Working capacity 150 gallons; total capacity 225 gallons. Fabricated steel trough shell jacketed for 150 psi. steam or water pressure. Cast iron trough ends are not jacketed. Saddle section has thermocouple for temperature control. Cast steel Sigma or Double Naben blades cored for circulating steam or water. Oil tight gear guards; anti-friction bearings. 50 HP motor.

BAKER PERKINS INC.
CHEMICAL MACHINERY DIVISION
SAGINAW, MICHIGAN

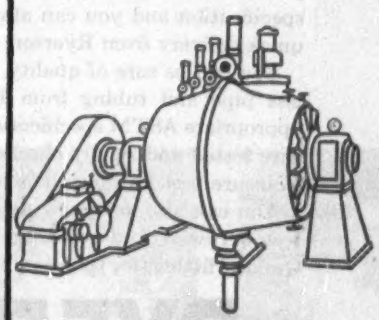
Other BAKER PERKINS products



EQUIPMENT FOR FOUNDRY INDUSTRY



CENTRIFUGALS



EQUIPMENT FOR RAYON PRODUCTION

242

Call Ryerson...

for Stainless Pipe and Tubing...*every other stainless product*

Just a single call to your nearby Ryerson plant brings everything you need in stainless pipe and tubing—any type, size or quantity for the most exacting requirements of heat and corrosion resistance.

That's because Ryerson stocks are not only large, but varied to meet your special applications. (See list at right.) What's more you can have your steel accurately cut to specification and you can always be sure of quick delivery from Ryerson.

You can be sure of quality, too. All stainless pipe and tubing from Ryerson meets appropriate ASTM specifications. All is pressure tested and rigidly checked for ductility to insure best forming characteristics.

You can also get quick delivery on stainless screwed and welding pipe fittings, Quikupl fittings for time-saving assembly and globe and gate valves. So for complete stainless service, including the help of our stainless specialists, call your nearby Ryerson plant.

STAINLESS PIPE AND TUBING IN STOCK

Note that our stocks include Schedule 5 and 10 light wall pipe which you can use in place of standard pipe for many applications. With light wall you reduce weight 17 to 65% — with proportionate savings in cost. Yet capacities are increased.

TP304 Pipe.....Schedule 5—Light Wall—Welded
Schedule 10—Light Wall—Welded
Schedule 40—Standard Weight—Seamless & Welded
Schedule 80—Extra Heavy Weight—Seamless

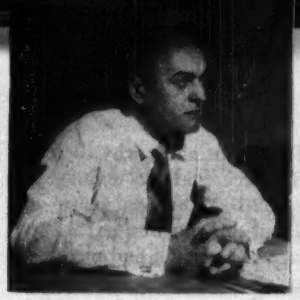
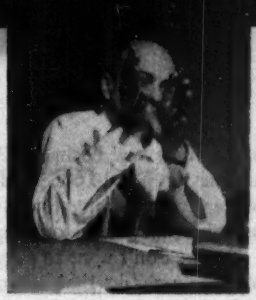
TP316 Pipe.....Schedule 5—Light Wall—Welded
Schedule 10—Light Wall—Welded
Schedule 40—Standard Weight—Seamless & Welded
Schedule 80—Extra Heavy—Seamless

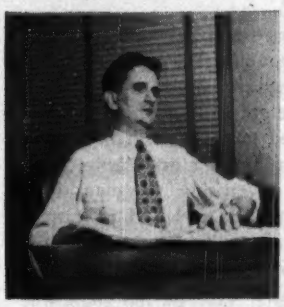
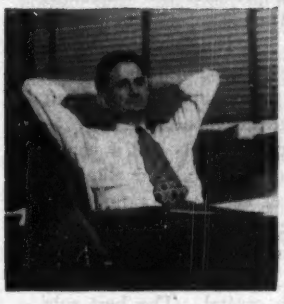
TP304 Tubing...Seamless & Welded
TP316 Tubing...Seamless & Welded

Other Stainless Products in Stock:
Rounds, Flats, Squares, Hexagons, Angles

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

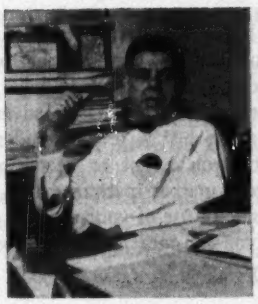
JULY 1953 Chemical Engineering

These Men Made A Success of Business For Themselves . . .

. . . Now they tell what it takes

A LITTLE over ten years ago, Jim Barnes was mixing paint formulations for one of the big manufacturers when he got the idea for a special coating for tough corrosive conditions. He mixed a few samples, tried them out and wrote a report detailing his findings and suggesting that management look into this industrial outlet.

Company officials read the report and after a respectable period of time, called Jim in. They thanked him for his report and suggested that it was a fine thing to have ideas and anytime he has ideas never to hesitate to call them to the attention of his superiors. "This firm was built on ideas," Jim's boss told him. Unfortunately though, the company was interested in interior house paints at the moment so Jim could keep his ideas on ice for a while.



About that time Jim's future got a boost. His grandfather died leaving him 25 thousand dollars. So he quit his job and set up a lab in his garage. In a few months he had developed a formulation that he thought would sell so he made up a few batches of it and took to the road. After a while, he got in to see a few plant people and persuaded them to test his coating. Meanwhile he went back home and rented a bigger garage, put in a few tanks and kettles and persuaded a door-to-door salesman and an unemployed garage mechanic to join him.

Then a few orders trickled in and a few more until today Jim is top man in a million-dollar-a-year business. The door-to-door salesman is vice president of sales and the mechanic is chief engineer; both are partners in the firm. Jim employs somewhere between 75 and 100 people.

He's pretty skittish when inquisitive editors ask him how much he earns but he belongs to the best country club, drives a Cadillac and visits Europe in the summer.

He feels pretty strongly about being in business for himself, too. "All this talk about hard work and long hours is overrated," he told us. "It's mostly a matter of guts. It takes guts to strike out on your own just as it takes guts to work yourself through four years of engineering school when your friends from high school are out earning good wages and raising hell. And if you do find a certain amount of success in your enterprise it takes guts—or foolhardiness—to live with the knowledge that your business could crumble almost overnight and leave you broke. So I don't recommend that everybody should go out and start his own business any more than I'd suggest that everyone should have a four-year technical education.

"The point I'd make is that the man with the ability to sell—and I don't mean only selling a product but selling ideas, character of company and self—and the man with real executive ability—not just blow-hard ability but the ability to make people work with him and for him, who can make people respect him, even be devoted to him—such a man can eventually earn ten times as much being his own boss as he can by working for someone else."

The name Jim Barnes is fictional; the story of his success is real. There's been plenty written and said about this subject of going into business for yourself and most of the authorities have plugged the virtue of long hours and hard work. But not many people have come right out and said, as Jim Barnes did, that you have to be a gambler—and often play the long shot—for success on your own. There's nothing easy about throwing away a $10,000-a-year job and risking your life savings on your idea no matter how good that idea is.

But that's usually what you have to do. You have to learn to deal with every type of person in practically every type of situation. You have to begin the most intensive program of self-education you'll ever know—the ABC's of business administration, learning to deal with lawyers, accountants, brokers, bankers, creditors, customers—and all this is only the beginning.

Obviously it wouldn't take a weak man very long to run out of steam in such a situation and even the strong man will grind down under the relentless attrition of customer resistance to a new product, a new service, a new company. Only an almost limitless drive and enthusiasm will carry a man over the rough spots of the first year or two of a new business. And that's precisely why there are maybe 50 $10,000-a-year men secure in the umbrage of big corporations for every $50-100,000-a-year entrepreneur riding herd on a small-but-thriving business.

But we don't want to discourage you. You'll find plenty of people to do that when you're ready to get started. If you've got your eye on your own business someday we'd like to point out some of the things you'll run into. We talked to all the people in sight and then we read all the literature obtainable on the subject. After that we asked some people, prominent in the industry, how they got their start and what some of their chief problems are. Jim O'Donnell, proprietor of the engineering firm that bears his name gives the picture of that type of organization. Otto York, president of Otto H. York, Inc., spells out the problems of producing and selling process equipment. And, to round out the story, Dan Reheis, president of Reheis, Inc., tells the story of the chemical manufacturer.

But first, let's look at some of the basics.

What Makes for Success?

There are four things you'll have to be darned sure of before you decide to hang out your shingle:

1. There must be a real need for your product or services. And that means you've got to know how much you can sell at a given price and profit. Don't confuse need with demand, though. One doesn't necessarily follow the other, and that's where advertising, salesmanship and promotion come in. You may be surprised to learn that you'd find "customer" resistance if you stood on a street corner and tried to give $5 bills away. But a few years ago somebody tried it in New York as a stunt. He didn't find many takers; most people were too suspicious of "something for nothing." You've got to know your customer—and your competitor.

2. You've got to have a pretty good amount of experience in your field. It seems ridiculous to point out that if you're going to design process plants you have to know all about the design of process plants and if you're going to manufacture saccharin you have to know all about the manufacture of saccharin, yet each year a few men are able to lay hands on a little capital and start out in business without enough experience. They usually fail the first year.

3. You've got to have enough capital. The best rule of thumb is to have "twice as much as you can possibly raise." Seriously though, you'll need enough to carry you for about six months or a year before sales roll in and profits are determined. In addition, you'll need some credit and enough reserve to meet unexpected minor emergencies.

4. You've got to have the right personality and plenty of business acumen—besides handling customers, employees, clients, creditors, you've got to have a fair acquaintance with bookkeeping, law, taxes, advertising and public relations to name just a few. Besides these, in the chemical industry you've got to keep up with the technological changes, market patterns and everything else that affects the sale or use of your product or services.

O.K. let's assume you can meet these four basic requirements. Where do you start?

Buy a Going Business—or Start One?

The authorities differ on this one. T. E. Wannamaker, a successful small chemical manufacturer, in a recent talk before the AIChE said that if he had it to do over today, he would purchase a going concern with a record of profits, then expand the facility by his own efforts. After 16 years experience, he believes this to be the cheapest method, the safest method, and in the long run, the quickest method. He points out that some of the bargains available today—even for very moderate investors—are surprising.

Other people are diametrically opposed to this viewpoint. They say there are no bargains available. Nine times out of ten a man wants to sell a business because it's in trouble—and why buy a ready made set of headaches?

Obviously there's no ready answer. You'll simply have to look at both approaches, size each up against your objectives and circumstances, then trust to pluck, luck and hard work.

In general, the established firm has a proved location and resources, available equipment, an inventory and established customers, while the "start-from-scratch" school lists among its advantages a complete freedom of products, layout, employees, etc., in short no beginning liabilities—or assets.

Well, suppose you decide to look at some going chemical businesses? How do you start—by chasing down the want ads?

The answer is usually, no, and the reasons are fairly obvious if you think about them for a while.

In the first place the owner who places a classified ad is sending out an SOS. He announces to the world "I'm getting out." So what happens? Remember, most small businesses are a one-man show—they stand, fall, go ahead or become stagnant as their owner and proprietor dictates. So when this kingpin announces that he's getting out from under, his employees get panicky and quit, his customers worry about supplies of material so they look elsewhere, then cancel orders. The business begins to fall apart. Meanwhile the owner probably doesn't know or care much about what's happening. He's spending all his time with prospective "buyers" some of whom are only curiosity shoppers.

Even if you do find an ad for a "wonderful, thriving business," how do you measure its success? How much of the owner's word can you take and where do you begin to check? Many a tyro has signed a "simple contract" which, he later found, obligated him to buy a business unconditionally—with no preliminary auditing of books, no joint inventory taking, no furnishing of credit information and no contractual agreement about who pays which share of the taxes.

This is probably the most glaring example of being "taken." Unless you really know your way around, you can be duped and fooled in hundreds of ways when buying. If you want to look into some of them, read Chapter IV, "Appraising A Going Concern" of the book "How to Organize and Operate A Small Business" by Kelley & Lawyer, Prentice-Hall, 1949.

Your best source of prospects is a reputable broker. When you've lined up some good looking prospects, talk to some of your friends in similar small businesses if any. They'll probably be glad to help you appraise your prospect. Your lawyer and accountant, if you have them, can help. So can trade associations, your secretary of state, your better business bureau and outfits like Dun & Bradstreet.

Most large cities have business appraisers who will do the job for you for a fee. If you hire one, make sure you check on his reputation.

About this time you'll be ready to look into:

Capital Requirements and Financing

There are a number of ways to figure your capital requirements but these are beyond the scope of this article. In chemical processing they're all pretty tricky and if you don't know the economic balances very thoroughly, you'd better have a cost engineer on your payroll as an employee or consultant. Factors like maintenance costs, bad batches of product, power failure, uncertain supply of raw materials, new versus used equipment, inexperienced operators, inadequate safety precautions and the like, almost demand a big margin of safety in the contingencies column and a pretty good rate of profit to offset the risk of obsolescence of product or process.

In general, your fixed capital can sometimes be pared by renting your building and buying used equipment and fixtures. Your working capital is your most critical item —Dun & Bradstreet list lack of it as one of the chief reasons for business failure. You need plenty of slack in this column.

Your intermediate capital, money invested in goods in process, shouldn't be much of a problem since there's usually a short interval of time between raw material and finished product so that credit from your suppliers shouldn't be hard to arrange.

With regard to sources of funds, you won't get much help, if any, from banks and lending institutions. Most surveys show that capital for small chemical enterprises comes from: (1) the proprietor himself, his cash plus whatever he can borrow on his signature, home or other personal effects—usually 50-80 percent of total capital; (2) relatives and friends—from 10 to 100 percent can come from this source; (3) partners. This last is one of the best ways for raising capital. The difficulty is that once the business gets on its feet, personality clashes develop because individuals differ on how the business should be run. These are, in general, the chief sources of capital for the small enterprise. Sometimes, but not often, small business loans can be arranged from your local bank.

So much for capital. Your next step will be to get a team of advisors to help you get started—a lawyer, an accountant, an advertising representative, and an insurance broker. The idea is to get their specialized advice before you get into trouble. Most people shudder at the thought of the cost of engaging such professional help. Actually many of these people will be glad to advise you at very modest costs initially, with the understanding that as the firm grows so will their interest grow with it.

For instance, a quick glance at some of the myriad legal matters you'll run into will tell you:

Why You Need a Lawyer

The minute you actively start your own business you'll begin signing contracts, leases, sales agreements. A big slip in any one of these can cost you plenty so you'll need your lawyer on tap to read the fine print in the important ones.

Chances are you won't be able to start operating without paying for some city, state and federal licenses, complying with all the local zoning laws, codes and ordinances, pollution regulations and the like.

Then you need to know more than you do about taxes—property, sales, excise, income, excess profits, capital gains, inventory—and all the records you have to keep for these purposes. You'll need your lawyer's help on pricing, advertising, labeling, financial arrangements, copyrights, patents.

You'll also need him to advise and set up your particular type of business structure whether proprietorship, partnership or corporation. And in addition to these "routine" calls he'll be a handy man to have on tap if and when you get into trouble.

Next, You Need an Accountant

Failing to keep adequate records, checks and balances is another of the chief reasons listed by Dun & Bradstreet for the demise of new businesses.

A man unfamiliar with bookkeeping might say, "Sure I've gotta keep some records but why make a fuss about it. Is it really important?" The answer is that good records are darned important to tell you such things as:

- The gross dollar volume of the business.
- The amount of money that customers owe—both current and past due.
- And is this amount too much?
- How much cash is on hand. Is it enough?
- How much of an inventory is on hand?
- How much money does the business owe its suppliers and others?
- What's the gross margin of earnings?
- Are business expenses too high?
- What are the net profits earned? What will be the income taxes on these?
- What is the net worth of the business?
- Is the business spending enough for research? Is it paying off?
- How is the business progressing from year to year?
- How does the business compare with similar businesses.

Above the necessity of keeping records, this list points up the value of keeping records. The checks and balances are apparent. The business that is spending too little for research or too little developing and exploiting new markets and new products is dying on its feet. So is the business with excessive inventories, credit or operating expenses.

Setting up and keeping a good set of records is easy. As a start you can begin your own education with the booklet, "Record Keeping for Small Stores" available from the U. S. Government Printing Office for 65 cents. The principles of good records are basically the same for any business and the booklet will give you a good grounding in the fundamentals.

The next step is to hire a good accountant to set up your books for you when you open shop. Once the books are set up you can hire a bright girl as secretary-office manager and either you or the accountant can teach her how to keep these books. After that all you have to do is bring the accountant in once every six months to audit the records. One further tip: when you get a good girl to keep your books be sure you pay her enough to keep her. Nothing will be more troublesome than training a succession of bookkeepers.

As soon as your business get rolling you'll need to . . .

Engage a Good Advertising Agency

You'll find this business of advertising and sales promotion one of your most troublesome, time-consuming, costly and frustrating activities. Yet, once you get the business on a firm footing and its management in capable hands—whether yours or others—this advertising and promotion activity is the one thing that will make the business grow.

To take liberties with Pope's well-known essay: "A little learning [of advertising and sales promotion] is a dangerous thing. Drink deep or touch not . . ."

Businessmen and engineers are practical men, so they're lost when dealing with the emotions. And no matter how much experience and logic and truthfulness and accuracy you can marshall before the prospective buyer of your "hexachlorocyclohex" or your heat exchanger you first have to warm him up and that means hitting the right emotional response.

So when you're ready, find a good, small advertising agency. Don't look for an impressive office or even impressive clients. Instead look for an agency with a man who knows your field and who will have the time to give your account his personal attention. Then give him his head and don't interfere. More advertising and promotion budgets are ruined by clients who think they know more about advertising than men who spend their lives at it than for any other reason.

Kelley and Lawyer point out a number of valuable "Do's" and "Don'ts" in advertising:

Do:

- Plan your advertising well in advance and follow your plan.
- Advertise consistently no matter how small each advertisement must be.
- Have an objective; know why you are advertising before you start.
- Know your best prospects, goods, selling points and the cost of advertising.
- Keep records of all advertising, analyze results and strive for improvement.

Don't:

- Advertise just to see your name in print.
- Release hastily prepared advertising.
- Advertise goods or services unless you know your claims are right. (If you don't remember anything else, never forget this maxim.)
- Scatter your advertising efforts.
- Be misled by the statement "It pays to advertise." Only effective advertising pays!

Now for the last member of your team:

Get a Good Insurance Broker

This is the easiest man to deal with and you don't pay him anything—directly.

It won't take you long to find that you'll have to have more insurance policies than you ever dreamed of. And you might as well get the right start here, too, by talking to a good, reliable broker pretty early in the game. He can advise you about coverage the law demands like workmen's compensation and disability insurance for injuries sustained on the job. Even if state laws don't require it, you'll have to carry this coverage because you'd lose your shirt if an injured employee should bring suit.

You'll need coverage of your plant or office or both against fire, flood and other hazards; you'll also have to protect your inventory and equipment.

It's also imperative to have business interruption policies which cover your loss in income when production is shut down due to fire, explosions or some similar catastrophe.

There will be quite a number of other policies you'll need but your broker can help you decide which are essential.

There are a number of general rules which it might pay to keep in mind when buying insurance.

- Don't overinsure. It would be wonderful to insure against every possible contingency but if you did you'd have no money left to run the business.
- You can save quite a bit by buying long-term policies.
- Consider flexible insurance that varies with seasonal inventories and short-term risks.
- Look into broad-coverage packaged policies that cover a great many risks for one premium.
- Don't buy any overlapping policies.
- If your budget is limited, pay attention only to those risks which could wipe the business out or seriously cripple it.

That's it for the insurance man who completes your team of advisers. If you pick your men carefully and treat them right you won't have much trouble solving the problems as they come up.

There are literally hundreds of other things that you'll have to know about, things like customer and employee and community relations, business policies, pricing, expense control, taxes and the like. But if you don't let the business get away from you by getting too big too fast you can solve most of the problems with your own common sense aided by judicious use of advice from the literature and personal contacts.

Most of the above principles apply to all business. To get the feel of the chemical industry we spent a good deal of time with the gentlemen mentioned earlier.

An Engineering Firm

J. P. O'Donnell

"As in any profession, engineers sell integrity and reputation in their specialized field instead of price. Clients offset these fees for competent engineering against savings in construction and plant operation."

James P. O'Donnell heads the engineering firm of the same name with offices in New York and Texas. His organization, which has been operating since 1945, specializes in design, procurement and initial operation of chemical and petroleum process plants. He employs a technical and clerical staff approaching 100 people.

"Getting an engineering firm started points up the difference between a service and a manufacturing organization," he says. "To get an engineering outfit started, you have to have wide experience and contacts which lead to clients. Capital is required only to sustain the proprietor until he has one or two firm contracts.

One of the biggest hazards of the engineering firm, according to O'Donnell, is the "boom or bust" cycle of the business. In a busy period, a firm may have to turn down good jobs because it hasn't enough engineers and draftsmen to handle them. A few months later, the group will go through a slack period of 3-6 months.

"It's these slack periods that hurt," says O'Donnell. "When you have 65 people on the payroll, 55 of them high-priced engineers and draftsmen with half a work load, how do you meet that kind of a payroll?" "Remember," he says, "when you're making money the tax collector is taking about half of it—right off the top. I think the federal government ought to allow fellows like us a 10 percent reserve of profits for these slow periods."

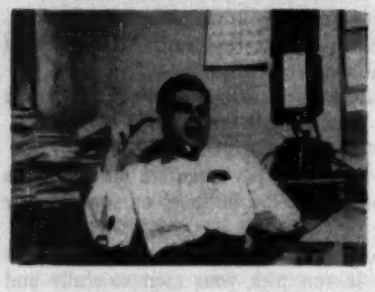
Jim O'Donnell believes that one of the most important things for a man in business to learn is fair and effective dealing with his employees. His men work on a profit sharing plan and enjoy some of the most liberal benefits in the industry. He also believes in developing men and giving them all the responsibility they can handle. Most of his engineers deal directly with clients if possible.

O'Donnell sees no particular problems in the administration of an engineering firm. At the beginning, he points out, you'll be the one man in complete control. "You can learn the details of running a really small business as you go along so long as you use your common sense and get competent advice on the really important matters as they come up."

The mistake most beginners make, he thinks, is turning loose that control too soon by getting too much organization into the business and conferring too many titles too fast. People get too specialized to do anything and the organization gets top heavy. Everyone in a new organization must keep versatile, he thinks, each man staying able to "roll with the ball."

The best piece of advice for beginners, O'Donnell maintains, is: "Do the very best job you know how for each client. You can't advertise an engineering firm except by word of mouth and reputation. A poor job is long remembered. But every outstanding job is another recommendation to a new client."

A Process Equipment Firm



Otto H. York

"You've got to have something really new and different to sell and a pretty fair amount of capital to get you started selling it."

Otto H. York, at 43, is head of two corporations, Otto H. York Co. and York Process Equipment Corp. He formed the first of these in 1947 to market a unique product—Yorkmesh—which is a knitted wire mesh of stainless steel wire as fine as 0.0035 in. in diameter. This mesh is very effective in entrainment separation and is now used extensively in oil refineries and chemical plants. The second company is a logical outgrowth of the first, producing and subcontracting the production of multistage liquid-liquid extractors and similar process equipment.

"The main qualification for success as a chemical equipment manufacturer," York says, "is to have a unique product that has a large potential market—and one that will really benefit the purchaser."

Next, he thinks you need enough capital to set up (rent or buy) your plant, equipment and initial stock—plus a minimum of $25,000.

If you take in a partner to raise the cash, this authority from Orange, N. J., suggests that he ought to be similar in age, social level and outlook, or else a good deal older than you are.

York doesn't think much of buying an existing business unless a very rare opportunity shapes up. "If they're good," he says, "they're overpriced. If they're bad, you don't want to get mixed up with them."

The biggest problem of the small equipment manufacturer is high taxes, he maintains, which prevent an owner from putting aside a cushion for slack periods. York says the big companies have the advantage here, since they managed to build up a reserve years ago when taxes were much lower.

On the other hand, a small company competing with a big one can run rings around the big one. A small outfit can move fast, often getting contracts while the big company is just beginning to study the problem. The big company tolerates—even encourages—inefficiency with unnecessary jobs, unproductive departments, "dead wood" and "free riders." In the small outfit, every man is a producer, usually with a personal stake or incentive in the business. "That's probably the biggest single asset of small business," says York.

"There are two sure ways," he concludes, "to go broke in the equipment business. The first is lack of familiarity with what you're selling; and the second is insufficient capital."

A Small Chemical Manufacturer

Daniel Reheis

"Get a product everybody needs but nobody's making. Then start small and spend every spare nickel on research."

Daniel H. Reheis is a good example of a small chemical manufacturer. He produces aluminum hydroxide gels and other fine chemicals in a modern plant nestled in a valley of the Watchung mountains at Berkeley Heights, N. J. He is president of Reheis, Inc.

We asked Dan how he got started in chemical manufacture and he told us that he became interested in his own business in 1936 when he was on the road for a firm of chemical merchants. He started by asking a young engineer from Brooklyn Poly to join him. Then he rented a vacant laboratory in Newark, N. J., and turned the young engineer loose to putter on some ideas for a few months. Reheis meanwhile, in calling on his drug accounts asked them for problems to work on. In this way he got the clue for his first product, aluminum hydroxide. There was a great demand for it among pharmaceutical manufacturers with nobody making it.

That started the Reheis company rolling and it's been going strong ever since. In 1946, Reheis bought some land and built a new plant at Berkeley Heights. The company now employs 50 people, 10 with degrees.

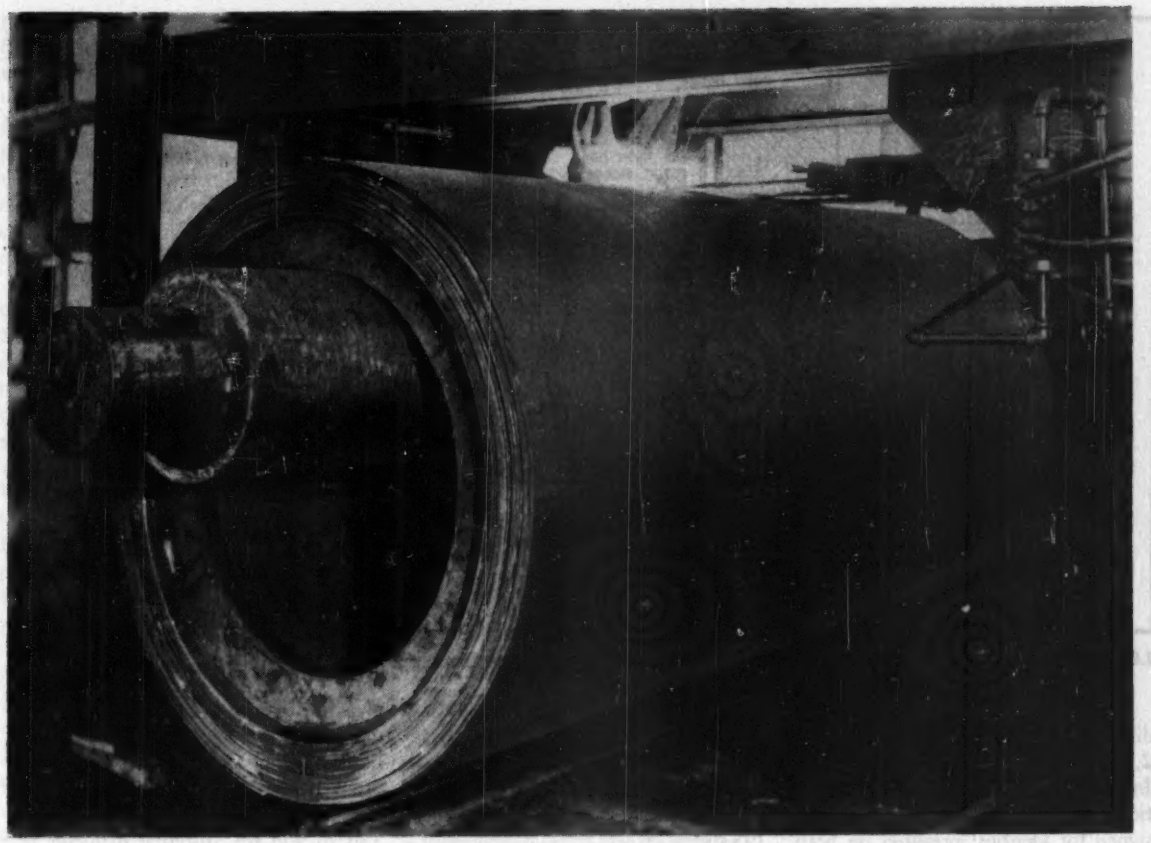
With regard to specific advice, Reheis suggested that a fellow with a good idea but no business ability might profitably team up with a partner who has the business ability.

He also suggested, as did the other authorities, that you keep the business small at first so that you have a good grasp of everything all the time. Then gradually add personnel to take up the routine stuff.

As for the problems of the small chemical manufacturer, they are all dominated and overshadowed by the problem of research. It amounts to the necessity to do profitable research in order to stay alive—and doing it with few personnel, limited facilities and resources. Reheis Co. spends an amount equal to 6-10 percent of its gross sales on research. Another problem is that the researcher in a small company has to spend a good deal of his time on customer service and production problems.

One of the biggest jobs of the small chemical manufacturer, Reheis maintains, is keeping a good personal relationship with the customer by filling orders promptly, keeping product quality high and helping customers with technical problems.

The two best ways to go broke, he says, are: (1) to turn out a faulty product; and (2) blunder in the administration of the business.



MULTI-LAYER SHELL, for high pressure heat exchanger, during wrapping operation in shop of A. O. Smith Corp.

Heat Exchanger Costs Today—II

Pressure, Temperature, Alloys . . .

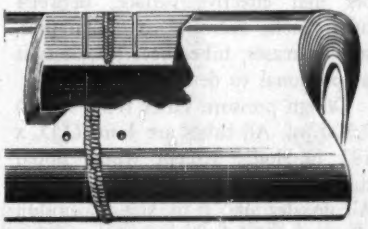
. . . These are factors that boost heat exchanger cost. How much, for your particular installation, can be found by using these data.

FRANK L. RUBIN

Data showing the relationship between exchanger design pressure and cost for several designs over a range of pressures were gathered from a number of manufacturers. There are some overlaps of information as well as some variations in costs. For an explanation of cost variation between manufacturers refer to the first article of series, *Chemical Engineering*, May 1953, p. 201.

All data presented in this study of the relation between design pressure and cost are based upon all-steel exchangers with tubes 16 ft. long spaced on square pitch.

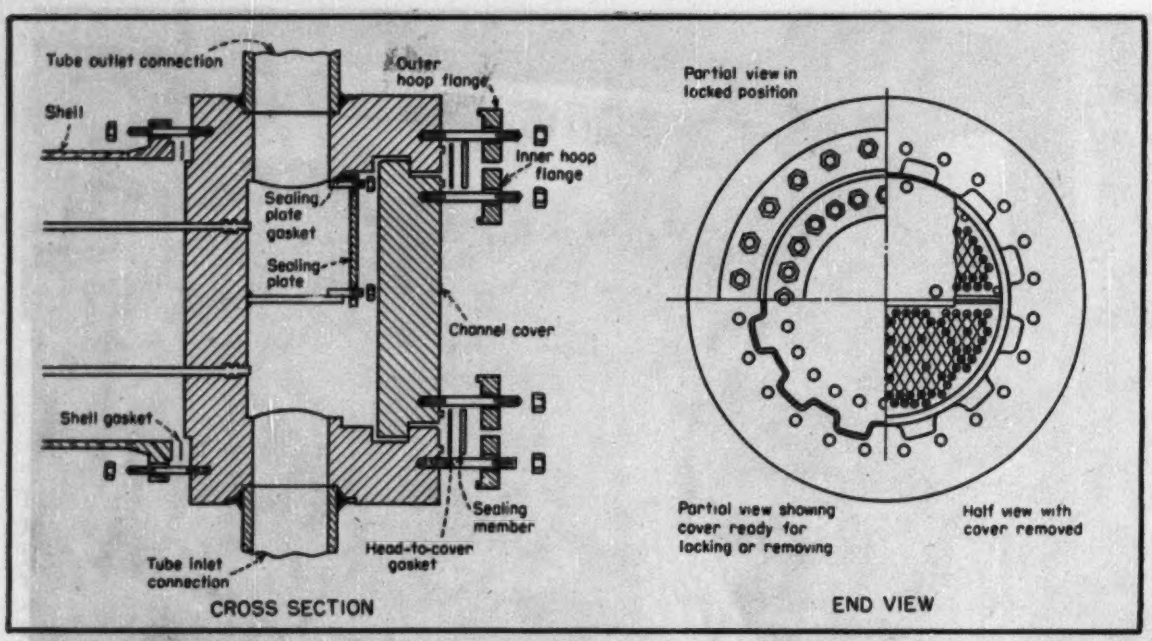
FRANK RUBIN of *Catalytic Construction Co., Philadelphia 2, Pa.* presents here the second of his timely articles on heat exchanger costs. The first article covering basic introductory material and low pressure shell and tube exchangers appeared in May. Coming—cost data on other types of exchangers including kettle reboilers and tank heaters.



CUT-AWAY of multi-layer shell shows liner, weep holes and weld.

Cost Vs. Design Pressure

Initial discussion is centered on conventional floating-head and U-tube exchangers for identical pressures on both sides ranging from 150 to 600 psi. Data cover a range of sizes; 400 to 2,500 sq. ft. surface, 14 to 36 in. shell diameter.



LOCK-JOINT channel cover of patented design built by Griscom-Russell is self-sealing for high pressure service.

Next to be considered are several different types, all with approximately 2,000 sq. ft. of heat transfer surface. Included in this group are conventional floating-head exchangers designed for identical pressures on both sides from 150 to 900 psi.; lock-joint floating-head exchangers designed for 300 psi. on the shell side and 600 to 2,500 psi. on the tube side; lock-joint U-tube exchangers built for 300 psi. shell-side pressure and 600 to 2,500 tube-side pressure.

The last group of exchangers discussed are U-tube units with approximately 880 and 3,300 sq. ft. of surface designed to operate with identical shell and tube side pressures over a range from 150 to 5,000 psi.

Variable Surface and Pressure—In gathering information on this first group of exchangers (conventional floating-head and U-tube, 150 to 600 psi. both sides) it was found that different manufacturers quoted widely varying prices. By screening this information it was possible to select two representative sets of cost ratios (Manufacturers A and B) for presentation in the accompanying table.

Ratios were computed by dividing exchanger cost by the manufacturer's cost for a 150 psi. floating-head exchanger having the same surface.

Constant Surface, Variable Pressure—All data in this group were furnished by Manufacturer C. Cost ratios are based upon his 150 psi. floating-head exchanger which weighs and costs more than the similar unit covered in the first article of this series. (May 1953.)

Each unit has a total surface of approximately 2,000 sq. ft. Remember that effective surface, between tube sheets, decreases as design pressure increases; tube sheet thickness is proportional to design pressure.

Remember these facts:

1. Relative costs are based on manufacturers' selling prices for February 1953 unless otherwise noted.
2. Installation costs are not included, unless so noted.
3. To adjust costs to your date of estimate, use equipment cost indexes such as the Marshall & Stevens Index appearing in *Chemical Engineering*.

Design pressure varies from 150 to 2,500 psi. All tubes are ¾ in. O.D. x 192 in. long. Except where noted tubes are 14 BWG (0.083 in. thick). All nozzles are 10 in. size. Corrosion allowance of ⅛ in. is included on both sides.

The first tabulation for this group gives relative costs as design pressure increases for conventional floating-head exchangers. Units are split-ring type with both shell and tube sides designed for identical pressures from 150 to 900 psi. Internal diameter is 33 in.

Often it is necessary to design exchangers with different pressures for shell and tube sides. In practically all cases it is more economical to keep the higher pressure fluid in the tubes. For pressures of 900 psi. and above the bolted type of construction as used in the conventional, split-ring, floating-head exchanger is generally not economical.

A more effective design makes use of a channel and tube sheet forged of a single piece of steel with a cover plate held in place by a lock design. This type of design utilizes the pressure on the tube side to hold the cover in place. Bolting is much smaller and less expensive than in the conventional design.

Only a few manufacturers have patents for this type of joint. Features of the Griscom-Russell patented lock-joint are shown in the sketch. With this design, pass partition plates are provided to eliminate the more expensive and troublesome staybolts of other designs.

When the lock-joint is used for the floating-head cover it is necessary to provide a much larger shell diameter

to permit the large forging at the floating end of the tube bundle to be withdrawn from the shell.

Data are tabulated for lock-joint floating-head units designed with 300 psi. shells and increasing tube-side pressure. Stationary tube sheet and channel are integrally forged; a similar construction is used at the floating end.

Costs for high pressure U-tube exchangers are much lower than for floating-head exchangers. The U-tube design eliminates an expensive forging at the floating end of the tube bundle. Shell size is reduced considerably since there is no massive forging to be withdrawn through the shell. Also the U-tube design eliminates a high-pressure joint which is potential source of trouble. Where dirty fluids are handled the U-tubes can be bent in a fashion to permit tube cleaners to navigate the bends.

Shown in the table are data for lock-joint U-tube exchangers with shells designed for 300 psi. and tube side design varying from 600 to 2,500 psi. Internal shell diameter of the exchanger is 33 in.

To illustrate the difference in cost a table is included, on p. 180, comparing floating-head and U-tube exchangers for high pressure service.

One Design, Wide Pressure Range—Cost figures furnished by Manufacturer D, effective April 30, 1953, are tabulated for U-tube exchangers with identical shell and tube side pressure from 150 to 5,000 psi. Sizes considered have internal diameters of 23 and 42 in. and heat transfer surfaces of approximately 880 and 3,300 sq. ft. Effective surface decreases with increased pressure.

Conventional bolted channels, rolled steel-plate shells and tubes rolled into tube sheets are used for 150, 300 and 450 psi. For 1,200 psi. and above tubes are welded to the tube sheet; shells are multi-layer; channel barrel and tube sheet are integrally forged in one piece.

Tubes are 1 in. O. D. x 16 ft. long on the straight run. Internal tube diameter is 0.782 in. up through the 1,200 psi. design. Tubes with an allowable stress of 16,000 psi. are used for higher pressures; 0.64 in. I. D. for 3,000 psi., 0.52 in. I. D. for 5,000 psi.

Cost Vs. Design Temperature

Allowable stress for every steel

How Exchanger Costs Climb With Pressure

Relative Costs—Conventional Floating-Head and U-Tube Exchangers, 150 to 600 Psi.

Design Pressure Both Sides, Psi.	Surface Area, Sq. Ft.	Relative Costs Floating Head Manufacture A	Floating Head Manufacture B	U-Tube Manufacture B
300	400	1.05	1.15	1.07
300	1,000	1.07	1.20	1.07
300	2,500	1.10	1.25	1.07
600	400	1.23	1.40	1.23
600	1,000	1.30	1.50	1.23
600	2,500	1.30	1.60	1.23

Note: Relative cost for each manufacturer is based on a value of 1.00 for his particular 150 psi. design

Relative Costs—Conventional Floating-Head Exchangers, 150 to 900 Psi.

Design Pressure Both Sides, Psi.	Effective Surface, Sq. Ft.	Weight, Lb.	Relative Costs Based On Total Surface	Effective Surface
150	2,000	18,600	1.00	1.00
300	1,984	22,000	1.13	1.14
600	1,960	29,000	1.22	1.24
900	1,939	34,000	1.55	1.60

Note: These relative costs furnished by Manufacturer C are based on a value of 1.00 for his particular 150 psi. design. Total surface is 2,045 sq. ft.

Relative Costs—Lock-Joint Floating-Head Exchangers, 600 to 2,500 Psi.

Tube Side Design Pressure, Psi.	Internal Shell Diameter, In.	Effective Surface, Sq. Ft.	Weight, Lb.	Relative Costs* Based On Total Surface	Effective Surface	Remarks
600	39	1,960	29,000	1.66	1.69	1.
900	42	1,939	38,000	2.17	2.24	2.
1,200	42	1,930	38,800	2.27	2.35	2.
1,800	46	1,905	54,000	2.78	2.92	2.
2,500	48	1,880	56,000	3.31	3.52	2., 3.

* These relative costs furnished by Manufacturer C are based on a value of 1.00 for his particular 150 psi. design. Total surface is 2,045 sq. ft. Shell side design pressure is 300 psi.
1. Bolted covers at floating head and channel.
2. Lock-joint covers at floating head and channel.
3. 12 BWG steel tubes used because of pressure.

Relative Costs—Lock-Joint U-Tube Exchangers, 600 to 2,500 Psi.

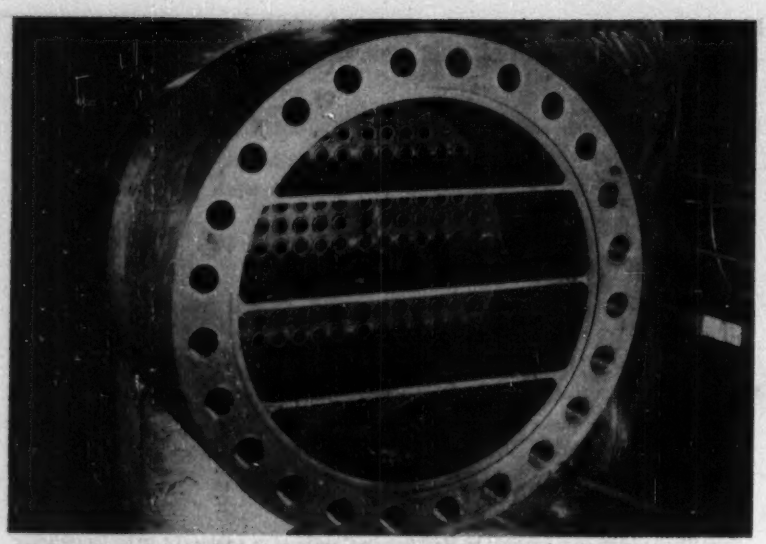
Tube Side Design Pressure, Psi.	Effective Surface, Sq. Ft.	Weight, Lb.	Relative Costs* Based On Total Surface	Effective Surface	Remarks
600	1,900	23,500	1.38	1.39	1.
900	1,980	24,500	1.58	1.60	2.
1,200	1,970	25,000	1.61	1.64	2.
1,800	1,960	25,500	1.76	1.80	2.
2,500	1,940	26,000	1.95	2.01	2., 3.

* These relative costs furnished by Manufacturer C are based on a value of 1.00 for his particular 150 psi. design. Total surface is 2,045 sq. ft. Shell side design pressure is 300 psi.
1. Bolted covers at floating head and channel.
2. Lock-joint covers at floating head and channel.
3. 12 BWG steel tubes used because of pressure.

Relative Costs—U-Tube Exchangers, 150 to 5,000 Psi., April 30, 1953

Internal Shell Diameter, In.	Design Pressure Both Sides, Psi.	Effective Surface, Sq. Ft.	Weight, Lb.	Relative Costs Based On Total Surface	Effective Surface
23	150	879	7,700	1.00	1.00
23	300	877	9,200	1.11	1.11
23	450	875	10,500	1.25	1.25
23	1,200	861	16,100	2.10	2.10
23	3,000	855	30,000	4.20	4.30
23	5,000	843	52,000	6.40	6.70
42	150	3,281	25,000	1.00	1.00
42	300	3,275	30,000	1.13	1.13
42	450	3,248	34,000	1.26	1.27
42	1,200	3,200	51,500	2.00	2.10
42	3,000	3,167	90,000	4.20	4.30
42	5,000	3,125	143,000	6.90	7.20

Note: These relative costs furnished by Manufacturer D are based on values of 1.00 for his particular 150 psi. designs. Relative costs cannot be compared between 2 different sizes. Thus 1.11 for a 23 in. I. D. unit at 300 psi. can be compared with all the 23 in. units but not with the 42 in. units.



ONE-PIECE channel and tube sheet for 1,250 psi. Note pass partitions.

specified by ASME* code is constant for the temperature range from minus 20 to 650 deg. F. Pressure-temperature ratings for flanged nozzles are not directly proportional to the stress values for the given material. For copper and copper alloys, the stresses are constant over a range from subzero to 150 deg. F.

A pressure-temperature rating chart for exchangers appears herewith. The chart was prepared for conventional floating-head exchangers. Ratings are directly applicable to U-tube exchangers. Where differential expansion is not considered, these ratings also apply to fixed-tube-sheet exchangers.

Ratings do not consider gasket materials. The cost of these is relatively insignificant and they can be replaced readily.

Any carbon steel exchanger can have a minimum design temperature of 500 deg. F. With 300 lb. ASA raised-face flanges a design temperature of 650 deg. F. involves no increase in cost. An all-steel exchanger designed for 182 psi. at 850 deg. F. can be identical with a conventional 300 psi. unit and would cost no more.

The conventional water cooled exchanger with Admiralty tubes, naval brass tube sheets, and other parts of steel can be operated at design pressure up to 150 deg. F. At 350 deg. F. the tube side of the 300 psi. unit is satisfactory for only 180 psi. When 70:30 cupro-nickel is substituted for the copper alloys, the tube side is satisfactory for 288 psi.; at 500 deg. F., the cupro-nickel unit is satisfactory for 264 psi., while the naval brass unit is not satisfactory.

When petroleum products or organic chemicals are cooled on the shell side of a heat exchanger, the tube sheet and tube wall temperatures seldom exceed the water outlet temperature, plus 20 deg. F. Since cooling water is generally discarded at 120 deg. F. or lower, the design temperature of 150 deg. F. for the tube side is adequate.

This temperature can be specified to give the lowest cost for the unit. Any reduction in this design temperature will not result in any saving. For these water cooled exchangers, the shell side design temperature can be selected on the same basis as for all-steel units.

*American Society of Mechanical Engineers—Rules for Construction of Unfired Pressure Vessels, 1952 Edition.

Comparative Costs
Floating Head vs. U-Tube

Tube Side Design Pressure, Psi.	Percent Extra Unit Cost for Floating Head
600	20
900	37
1,200	41
1,800	58
2,500	70

Note: Shell side design pressure is 300 psi.

Relative Costs of Copper Alloy and Aluminum Tubing, April 1, 1953

Admiralty	1.00
Inhibited Admiralty	1.00
Munts metal	0.98
Arsenical copper	1.10
90:10 Cupro-nickel	1.24
80:20 Cupro-nickel	1.32
70:30 Cupro-nickel	1.41
Aluminum	0.34

Plate and Tubing Cost

Costs for tubing are functions of material, tube diameter, tube wall thickness, quantity, tube length and applicable specifications. The importance of the first three items is quite obvious.

Quantity is of basic importance in determining price. For instance, Admiralty tubing ¾ in. x 12, 14 or 16 BWG has a base price of $0.5864 per lb. In 30,000 lb. lots the cost is

Pressure-Temperature Ratings for Heat Exchangers

Design Pressure	150	150	300	450	600	150	300	450	600	150	300	450	600
Tube Material	Steel					Admiralty				70:30 Cupro-nickel			
Tube Sheet Material	Steel					Naval brass				70:30 Cupro-nickel			
Nozzle Rating	150	300	300	400	600	150	300	300	400	150	300	300	400
Side	Shell and tube					Tube*							
Design Temperature, deg. F.	Pressure Ratings at Elevated Temperatures												
150	150	150	300	450	600	150	300	450	600	150	300	450	600
250	150	150	300	450	600	134	268	402	536	150	300	450	600
300	150	150	300	450	600	126	252	378	504	146	293	439	586
350	150	150	300	450	600	90	180	270	360	144	288	432	576
400	150	150	300	450	600	24	48	72	96	140	281	421	562
450	150	150	300	450	600					135	271	406	542
500	150	150	300	450	600					132	264	396	528
550	140	150	300	450	600					126	252	378	504
600	130	150	300	450	600					120	240	360	480
650	120	150	300	450	600					114	228	342	456
700	110	145	290	433	578					108	216	324	432
750	100	131	263	395	526								
800	92	111	222	334	445								
850	82	91	182	274	364								

Note: All pressures are psig. All nozzles are ASA raised face. Shell, shell cover, channel, channel cover and floating head cover are steel A-285 Grade C. Tubes are steel A-179, Admiralty or 70:30 cupro-nickel B-111. Tube sheets are steel A-201 Grade A, naval rolled brass (NRB) or 70:30 cupro-nickel B-171.
*The shell side rating for units with water in the tubes is generally equivalent to that for all steel units.

base less $0.0225; for 2,000 lb. the base price holds; for 300 lb. the extra charge is $0.15 per lb.; for 100 lb. there is an extra charge of $0.30 per lb. Extra charges are added for long tubes (i.e. over 30 ft. for brass tubing). Higher charges are incurred for steel tubing drawn to minimum wall rather than average wall specifications.

Average curves have been drawn for the costs of ¾ in. O.D. x 16 BWG admiralty and carbon steel tubing. These are represented as straight lines on log-log paper.

Actually there is some variation. Costs as shown do reflect the reductions granted with quantity purchases. For heavier tube walls one can use these costs times the weight ratio of the two tubes. For example, 1,000 sq. ft. of ¾ in. O.D. x 16 BWG Admiralty tubing cost $1,615; the same quantity of ¾ in. O.D. x 14 BWG Admiralty tubing cost $1,615 x (0.6750/0.5428) or $2,010.

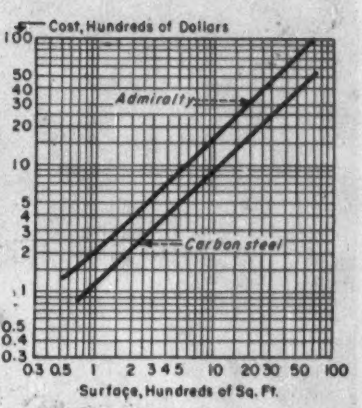
For other sizes of tubing the variation in cost per lb. is slight and one may follow the same practice. For instance, 1,000 sq. ft. of 1 in. O.D. x 16 BWG Admiralty cost approximately $1,615 (0.7410/0.5428) (0.75/1.0) or $1,655. It is necessary to multiply by the diameter ratio (0.75/1.0) since fewer linear feet are required for a given tube surface with a larger tube diameter.

Relative costs for carbon steel, alloy steel and stainless steel plate and tubing on March 15, 1953 are tabulated. With this and other data within this series of articles it should be possible to make estimates for the cost of various types of alloy and stainless steel exchangers.

Special annealing and welding procedures are required for certain alloy and stainless materials. Shop costs for units fabricated of these materials are necessarily higher when special techniques are required.

Relative costs on April 1, 1953 for copper alloys and aluminum are also given.

Exchanger costs shown in this series reflect quantity discounts which were available to manufacturers for stock and quantity items. The relative prices for alloy exchangers appearing in the May article do not reflect such savings. Costs for both small standard and floating-head exchangers are probably based on the tubing charges given in the table which apply to quantity purchases.



AVERAGE COSTS for exchanger tubing, ¾ in. O.D. x 16 B.W.G.

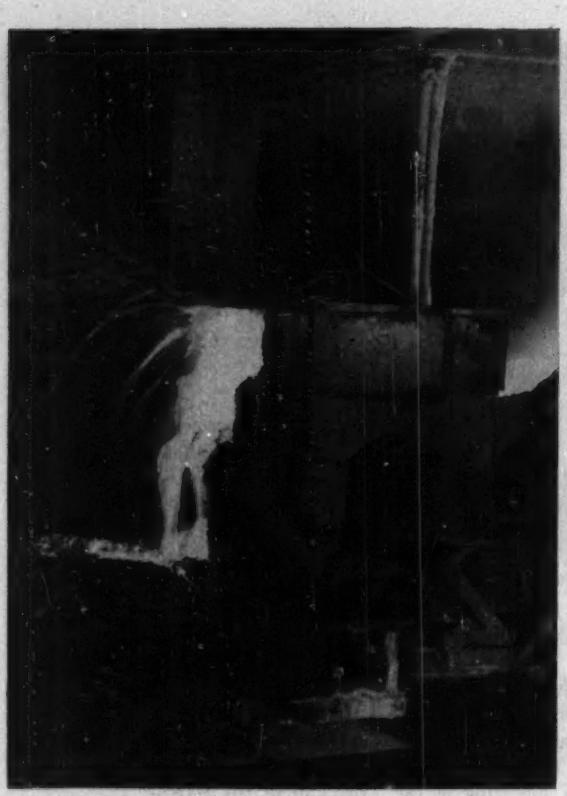
Acknowledgement

A list of all companies contributing data for these articles will be listed at the end of the series.

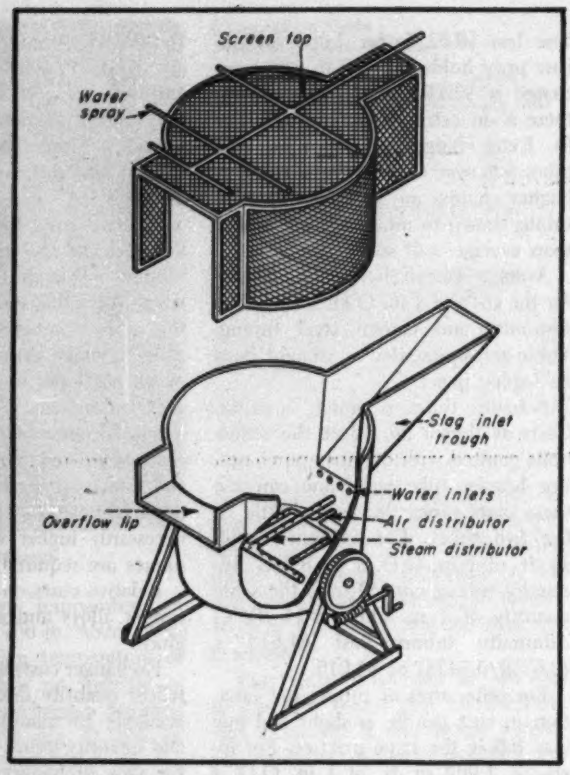
Relative Costs of Alloy Steel Tubing and Plate, March 15, 1953

No.	Alloy Material	Pipe and Tubing Data: ASTM Specification Numbers or Chemical Analyses	Relative Cost	Plate Data: ASTM Specification Numbers or Chemical Analyses	Relative Cost
1.	Carbon Steel	A-53, A-106, A-161, A-192	1.00	A-285 grade C, fire box quality, non-copper	1.00
2.	Carbon-0.5 Mo	A-161; A-206, P1; A-209, T1, T1b; A-335, P1	1.65	A-204	1.95
3.	Carbon-1.0 Mo	C 0.1/0.2, Mn 0.3/0.8 P 0.045 max., S 0.045 max., Si 0.1/0.5 Mo 0.8/1.1	1.77	Open hearth C 0.1/0.2, Mn 0.3/0.8, P 0.035 max., S 0.04 max., Si 0.1/0.5, Mo 0.8/1.1	2.10
4.	0.5 Cr-0.5 Mo	A-280; A-335, P2	1.91	A-301, Grade A	2.00
5.	1.0 Cr-0.5 Mo	A-213, T12; A-315; A-335, P12	2.00	A-301, Grade B	2.31
6.	1.25 Cr-0.5 Mo	A-158, P11; A-199 Gr. 1; A-200 Gr. 1; A-213, T11; A-335, P11	2.12	Electric Furnace C 0.15 max., Mn 0.3/0.6, P 0.025 max., S 0.025 max., Si 0.5/1.0, Cr 1.0/1.5, Mo 0.45/0.65	2.66
7.	2.0 Cr-0.5 Mo	A-158, P3b; A-199 Gr. 4; A-200 Gr. 4; A-213, T14; A-335, P3b	2.28	Electric Furnace C 0.15 max., Mn 0.3/0.6, P 0.025 max., S 0.025 max., Si 0.5 max., Cr 1.65/2.25, Mo 0.45/0.65	3.07
8.	2.5 Cr-0.5 Mo-0.75 Si	A-200 Grade 2	2.46	Electric Furnace C 0.15 max., Mn 0.3/0.6, P 0.025 max., S 0.025 max., Si 0.5/1.0, Cr. 2.15/2.85, Mo 0.45/0.65	3.31
9.	2.25 Cr-1.0 Mo	A-199 Gr. 6; A-200 Gr. 6; A-213, T22; A-335, P22	2.53	Electric Furnace C 0.15 max., Mn 0.3/0.6, P 0.025 max., S 0.025 max., Si 0.5 max., Cr 1.95/2.55, Mo 0.9/1.1	3.34
10.	3.0 Cr-0.5 Mo-1.25 Si	C 0.15 max., Mn 0.5 max., P 0.03 max., S 0.03 max., Si 1.0/1.4, Cr 2.65/3.35 Mo 0.45/0.66	2.53	Electric Furnace C 0.15 max., Mn 0.5 max., P 0.025 max., S 0.025 max., Si 1.0/1.4, Cr 2.7/3.3, Mo 0.45/0.65	3.39
11.	3.0 Cr-1.0 Mo	A-199 Gr. 5; A-200 Gr. 5; A-213, T21; A-335, P21	2.66	Electric Furnace C 0.15 max., Mn 0.3/0.6, P 0.025 max., S 0.025 max., Si 0.5 max., Cr 2.70/3.3, Mo 0.9/1.1	3.47
12.	5.0 Cr-0.5 Mo	A-158, P5a; A-199 Gr. 8; A-200 Gr. 8; A-213, T5; A-335, P5a	3.37	A-357-52T Type 501 Mo	5.58
13.	5.0 Cr-0.5 Mo-1.5 Si	A-158, P5b; A-213, T13; A-335, P5b	3.63	Based on Type 501	5.87
14.	7.0 Cr-0.5 Mo	A-158, P16; A-199 Gr. 7; A-200 Gr. 7; A-213, T7; A-335, P16	3.78	Based on Type 501	6.16
15.	5.0 Cr-0.5 Mo-titanium	A-158, P5c; A-213, T16; A-335, P5c	4.28	Based on Type 502	7.09
16.	9.0 Cr-1.0 Mo	A-158, P17; A-199 Gr. 9; A-200 Gr. 9; A-213, T9; A-335, P-17	4.69	Based on Type 501	6.98
17.	12.0 Cr Type 410	A-268, TP410	9.40	A-176 Grade 2 Type 410, A-240 Grade A Type 410	7.91
18.	12.0 Cr-Al Type 405	A-268, TP405	9.40	A-240 Grade C Type 405	8.26
19.	18.0 Cr-8.0 Ni Type 304	A-158, P8a; A-213 TP304; A-269, TP304; A-270; A-271, TP304; A-312	10.47	A-167 Grade 3 Type 304, A-240 Grade S Type 304	10.06
20.	17.0 Cr Type 430	A-268, TP430	9.85	A-176 Grade 4 Type 430, A-240 Grade D Type 430	8.02
21.	27.0 Cr Type 446	A-268, TP446	11.27	A-176 Grade 6 Type 446	10.29
22.	18.0 Cr-8.0 Ni, titanium Type 321	A-158, P8b; A-213, TP321; A-269, TP321; A-271, TP321; A-312	12.09	A-167 Grade 5 Type 321, A-240 Grade T Type 321	11.45
23.	18.0 Cr-8.0 Ni, columbium Type 347	A-158, P8d; A-213, TP 347; A-269, TP347; A-271, TP347; A-312	12.80	A-167 Grade 6 Type 347, A-240 Grade C Type 347	12.62
24.	18.0 Cr-8.0 Ni, molybdenum Type 316	A-213, TP316; A-269, TP316; A-312	16.70	A-167 Grade 11 Type 316, A-240 Grade M Type 316	14.30
25.	25.0 Cr-20.0 Ni Type 310	C 0.15 max., Mn 2.0 max., P 0.03 max., S 0.03 max., Si 0.75 max., Cr 24.0/26.0, Ni 19.0/22.0	20.09	A-167 Grade 10 Type 310	16.51

Note: Tubing data from National Tube Div., United States Steel Corp., plate data from United States Steel Corp. Relative plate prices are for a representative plate size—¾ x 72 x 120 in. Where ASTM specification numbers are not given it is necessary to specify the steel by analysis.



LIGHTWEIGHT aggregate is made from slag using . . .



AIR, steam and water in this TVA expansion forehearth.

New Use for Phosphate Slag

Electric-furnace smelting of phosphate rock yields about 8 tons of slag per ton of phosphorus produced. Here's a way to expand this slag into a lightweight aggregate for concrete.

W. C. SCOTT, JR. and W. D. SANDBERG

Some types of phosphate slag from electric-furnace smelters can be used as agricultural liming agents (see *table*). Others are sold as railroad ballast or are simply dumped.

TVA slag, when sold for liming or ballast, has had to compete with low-priced limestone or ballast rock that's readily available in most Tennessee Valley locations. For this reason, the slag can be sold profitably only within an area that can be reached by short freight hauls and quite often the demand for liming materials or ballast near the furnaces is much less than the amount of slag produced.

This situation prompted TVA engineers to find a way to convert the slag to another form so that it could be used in other applications. They came up with an expansion process.

▶ **Expanded Slag**—The new process provides a simple method for increasing the value of and the demand for phosphate slag. The popularity of lightweight aggregate for concrete block manufacture and other concrete construction provides a large, growing market.

And, since competitive aggregates are available from only a few, widely-scattered locations, expanded slag can be profitably shipped to a much wider market area than granulated or air-cooled slag.

▶ **The Process Is Simple**—Furnace slag flows through a forehearth (see cuts *above*) where it is treated with water, steam and air. The expanding slag then overflows into a receiver where expansion is completed and the product solidifies. This slag, after being crushed, is ready for use.

In starting a run, a 3-in. layer of wet, granulated slag or sand is put in the bottom of the forehearth to provide uniform expansion at the beginning of the run. It also serves to insulate the bottom of the vessel and facilitates cleaning.

Steam and air are started in at low rates just before the phosphorus fur-

W. C. SCOTT *is a chemical engineer with the Tennessee Valley Authority's Office of Chemical Engineering, Wilson Dam, Ala.* W. D. SANDBERG, *formerly of the same organization, is now with the Atomic Energy Commission, Aiken S. C.*

nace is tapped and are then regulated to give vigorous agitation during the run. The flow of water starts when the forehearth is about two-thirds filled with molten slag and flow is regulated to give maximum frothing.

The larger TVA phosphorus furnaces–11,000 kw.–are tapped every hour, each tap lasting about 20 minutes. During the tap, approximately 750 lb. per min. of slag flows from each furnace.

The forehearth used for large-scale tests is made of ¾-in. steel plate. It is 2½ ft. deep and has slightly tapered sides, making it 3 ft. in diameter at the top and 2¾ ft. at the bottom. At the rear is an inclined trough designed to introduce molten slag about 7½ in. above the bottom of the forehearth. Opposite the trough is an opening through which processed slag overflows into the receiver.

Water enters through four ½-in. pipes located just below the slag inlet. Steam and air are introduced through distributors about 3 in. off the bottom. These are made of 1- and ½-in. pipe, respectively, with ⅛-in. holes drilled along the top.

The receiver is a ⅜-in. plate steel pan, 12 ft. long, 10 ft. wide and 15 in. deep. It's large enough to hold about half the slag normally obtained in one furnace tap and its sides are tapered to facilitate removal of the solidified product.

When processing 750 lb. per min. of slag, best results are obtained with a slag-to-water weight ratio of 5-10, a slag-to-steam (130 psi.) weight ratio of about 40 and a slag-to-air (100 psi.) weight ratio also about 40.

▶Easily Controlled–The expansion process has three important control criteria:

- There must be enough agitation in the forehearth to distribute the process water in the molten slag and to prevent formation of a frozen layer of slag at the water inlet level.
- The processed slag must be viscous and "just flowable" (1,900-2,100 deg. F.). Excessively high temperatures give a dense product and low temperatures cause the slag to freeze in the vessel.
- The receiving pan must be of such a size that slag doesn't spread over a large area. Confining the slag in this manner prevents the easy escape of trapped gases from the cooling mass.

Typical TVA Phosphorus Slag

	Percent
SiO_2	39.0
CaO	50.0
P_2O_5	1.0
R_2O_3	6.5
F	2.5

Particle-size Distribution for Expanded TVA Slag crushed to –¾ in.

Mesh Size	Percent
+4	25
+8	42
–50	23
–100	14

The test model forehearth is mounted on a stand so that it can be inverted for quick cleaning. This is necessary because electric phosphorus furnaces usually are not tapped continuously and slag remaining in the forehearth solidifies rapidly. This must be removed after each tap.

A removable screen cover of heavy-duty, closely-woven wire intercepts any particles of molten slag thrown upward by action in the forehearth, and a water spray on the cover prevents the formation of a solid mass of frozen slag on the underside of the screen. The screen is about 15 in. above the forehearth and strips of screen are welded to the sides of the supporting frame to shield the surrounding area.

No difficulties have been encountered in processing slag at 500-800 lb. per min. except that the steel-plate shell warped after several weeks of use. It is felt that commercial forehearths should be built as cast-steel units with 2-in. thick walls.

It is also believed that a heavy-duty pan conveyor with individual pan capacities under 1,000 lb. of expanded slag would be better than the type used in the pilot work. Tests have shown that better expansion is obtained with small receivers which fill rapidly and provide more effective confinement of the slag.

▶Building Blocks–Expanded slag made by this process is cellular. When crushed to –¾ in., the size used in lightweight building blocks, the product's bulk density is about 50 lb. per cu.ft. Product crushed to this size (*see cut below*) has been used successfully in the experimental production of modular 8x8x16-in. lightweight concrete blocks in a commercial block machine. The concrete mixture was made with a cement-to-aggregate ratio of 1:7, as recommended.[2]

These blocks weighed less than 30 lb. and exceeded the ASTM compressive strength requirements for grade B blocks (700 lb./sq. in., average after aging 28 days–ASTM C90-44). One lot was tested after aging 19 weeks to determine the extent of any strength increase. These blocks were strong enough to pass the ASTM compressive strength test for grade A units (1,000 lb./sq.in., average).

In other tests, the compressive strength of concrete cylinders (ASTM C192-49) made with expanded electric-furnace slag compared favorably with cylinders using commercial lightweight aggregates such as expanded shale and expanded iron blast-furnace slag.

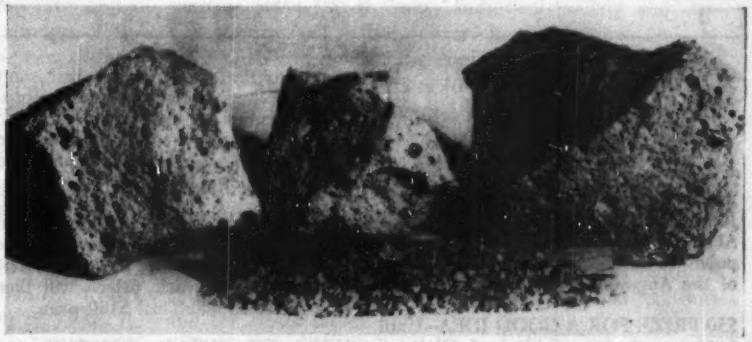
Phosphorus producers have shown considerable interest in the new process and at least one company plans to install slag-expansion equipment.

ACKNOWLEDGEMENTS

The following made important contributions to this work: B. U. Durham and L. A. Edwards of the Wilson Dam Phosphate Branch; A. W. Beinlich, M. R. Burns, A. B. Harrison, G. G. Patterson, E. L. Stout and J. M. Stinson of the Development Branch.

REFERENCES

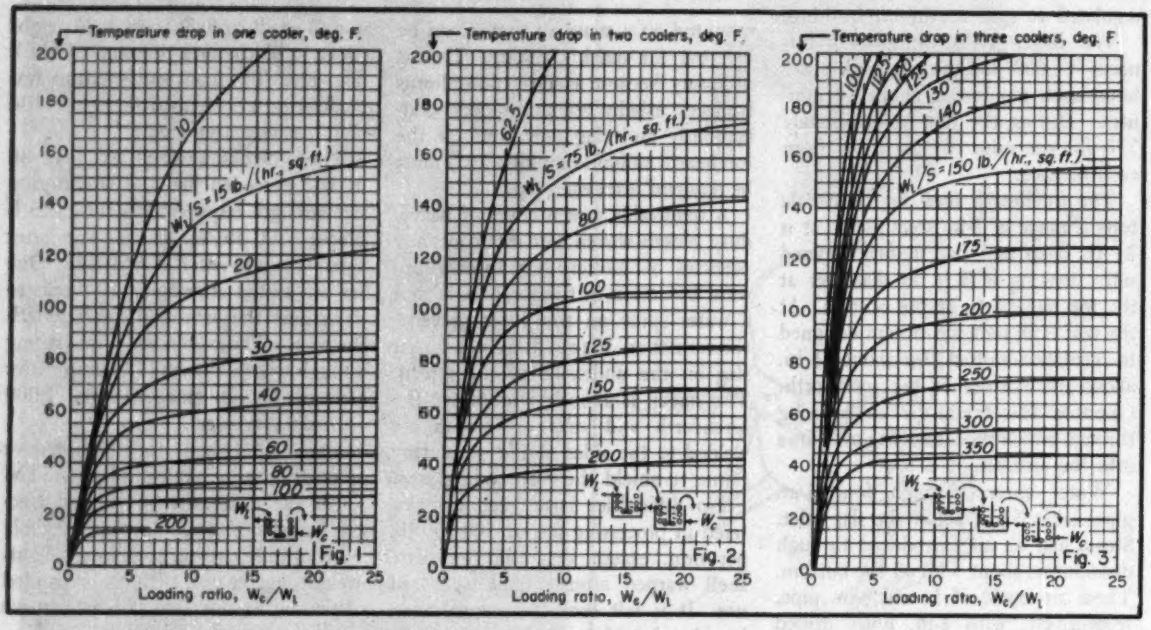
1. Stout, E. L., Scott, W. C., Jr., and Stinson, J. M., U. S. Patent 2,590,901.
2. Underwriter's Laboratories, Inc., *Standard for Concrete Masonry Units*, March, 1945.



EXPANDED slag is crushed for use as aggregate in concrete blocks.

The Plant Notebook

Edited by Theodore R. Olive


Temperature drop in one cooler, deg. F.
Loading ratio, W_c/W_l
W_l/S = 15 lb./(hr., sq. ft.)
Fig. 1
Temperature drop in two coolers, deg. F.
Loading ratio, W_c/W_l
W_l/S = 75 lb./(hr., sq. ft.)
Fig. 2
Temperature drop in three coolers, deg. F.
Loading ratio, W_c/W_l
W_l/S = 150 lb./(hr., sq. ft.)
Fig. 3

Curves Can Simplify Your Problems In Estimating Cooling Tanks

ROBERT S. COOK, *Chemical and Professional Engineer, Zaremba Co., Buffalo, N. Y.*

★April Contest Prize Winner

Performance curves on heat exchangers can be useful as well as interesting. For a recurring type of problem they can be helpful in the visualization of how well a given exchanger or set of exchangers will meet a given duty, and will save time in designing exchangers for the duty.

The curves presented here were made for coil-in-tank coolers. Water is the coolant flowing through one or more coils submerged in a tank in which the liquor is agitated substantially to uniformity of temperature. Steady-flow conditions are assumed, and where more than one cooler is used, the liquor flows from cooler to cooler, counter to coolant flowing from the coldest to warmest cooler. Of course, this condition can approach true countercurrent flow only as the number of coolers becomes infinite. The curves are based on a cold terminal temperature difference of 20 deg. F. This is only a particular type of recurring problem, of course, but it would seem that there must be others of similar nature for which curves would be helpful.

The three sets of curves, for one, two or three coolers, are based on the equation:

$$Y = AD\,(W_c/W_l)\,(1 - 1/e^z)$$

where Y is the cooling of the liquor, deg. F.; A is the ratio of specific heats of coolant to liquor, taken as 1.35; D is the cold end terminal temperature difference, deg. F., taken here as 20; W_c and W_l are respectively the weight flow rates of the coolant and the liquor, lb./hr.; e is the base of natural logarithms; $z = SU/W_c$; S is the cooling surface, sq. ft.; and U is the overall heat transfer coefficient, Btu./(hr., sq. ft., deg. F.), taken as 100 for one cooler, as 100 and 140 for two coolers, or as 100, 120 and 160 for three coolers.

One or two hypothetical cases will illustrate use of the

★May Contest Prize Winner

"Things You May Not Know About Casters for Materials Handling."

A prize of $50 in cash will be awarded to Robert L. Miller, mechanical engineer, Akron, Ohio. Mr. Miller's article will be published in the Plant Notebook section of the August issue.

$50 PRIZE FOR A GOOD IDEA—Until further notice the Editors of *Chemical Engineering*, will award $50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook. Each month's winner will be announced the second following month and published the third following month.

$100 ANNUAL PRIZE—At the end of each year the monthly winners will be rejudged to determine the year's best Plant Notebook article, which will then be awarded an additional $100 prize.

HOW TO ENTER CONTEST—Any reader of *Chemical Engineering*, other than a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 500 words, but illustrated if possible. Articles which are acceptable but are not winners will be published at regular space rates ($10 minimum).

Articles may deal with plant or production "kinks," or novel means of presenting useful data, which will interest chemical engineers. Address Plant Notebook Editor, *Chemical Engineering*, 330 West 42nd St., New York 36, N. Y.

curves. For example, suppose we have a case where it is desired to cool the liquor 100 deg. F. With one cooler, it is apparent from Fig. 1 that the liquor flow cannot be more than 25 lb./(hr., sq. ft.) of cooling surface.

For any given cooler, the normal water flow through the coil or coils is conveniently assumed. A reasonable rule to use here is to set the normal water flow such that the velocity may be doubled without incurring excessive pressure drop. This will insure some reserve capacity for surface fouling.

If the physical limitations of the coils call for a ratio of coolant flow to liquor flow of 4 to 1 as normal in the case of the one cooler, then the liquor loading W_l/S cannot be more than 10 in order to obtain the required cooling. This doesn't seem like a very good condition, since it is apparent that it would give a cooler of much greater capacity than needed if we had greater than normal flow of coolant. We therefore check Fig. 2 for two coolers and find that the liquor loading may be increased eight or nine times (requiring 1/8 or 1/9 of the surface in each of two coolers) for the same rate of coolant flow. Similarly, a set of three coolers allows the loading to go to 175 lb./(hr., sq. ft.). With this picture readily available, the economics of building the three sizes of cooler may more quickly be considered. Then, with the preliminary selection made as to number and size of coolers, the final evaluation of their performance may be made by actual calculation if the accuracy of the assumptions justifies it.

A TYPICAL EXAMPLE

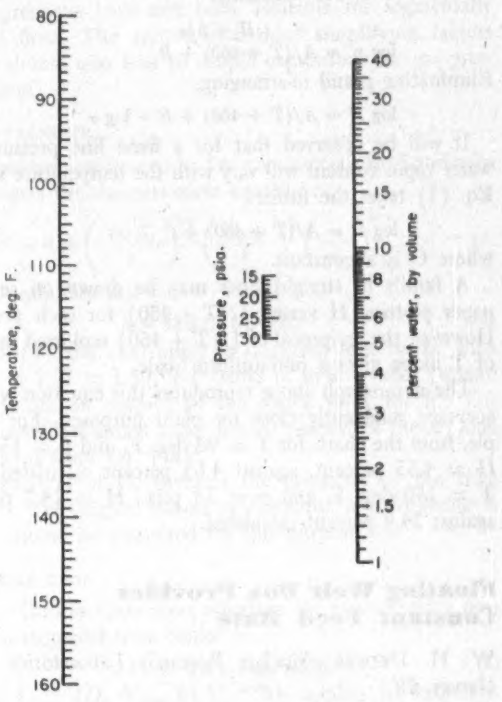
Let us assume that it is necessary to cool 10,000 lb./hr. of solution from 180 to 80 deg. F., using water at 60 deg. F. as the coolant. The characteristics of the solution are such that the expected coefficients will be the same as used in the curves. Furthermore, let it be assumed that it is most convenient in this plant to use a certain diameter of tank, which can be installed in anywhere from one to three coolers; also, that tubing available for coils is a nominal 3-in. diameter, and that it is possible to put as many as four coils in parallel in each tank.

With four coils in parallel, each will handle about 130 gpm. water at 6 ft./sec. velocity, which can be doubled within reasonable pressure drop limits. This allows us to say that the normal water rate is 520 gpm. or 260,000 lb./hr. The first thing we notice here is that the ratio of flows (W_c/W_l) is 26. This is obviously too high, since increasing the coolant flow will give practically no additional cooling capacity. We therefore can say that only one coil will be put in each tank, giving a flow ratio of 6.5.

With our ordinate of 100 deg. F. and abscissa of 6.5 we find the various loadings in the case of one, two, or three coolers. One cooler gives a loading of about 18, with about 15 deg. F. additional cooling capacity when the water rate is doubled. Two coolers give about 95 for the loading, with about 10 deg. F. additional cooling capacity for double the water rate. Three coolers give about 190 for the loading, with about 5 deg. F. additional cooling for double the water rate.

The surface required in each case is then estimated: 10,000/18 = 555 sq. ft. in one cooler; 10,000/95 = 105 sq. ft. in each of two coolers; or 10,000/190 = 53 sq. ft. in each of three coolers. Actual calculation of the coefficients needed to accomplish the duty under the assumed conditions will check very closely the coefficients represented by the curves.

After we have gained some familiarity with a given set of curves, we can make trial choices of cooling surface with sufficient accuracy to save time and calculation, even where some of the factor values of the problem differ considerably from those on which the curves are drawn.



Nomograph Gives Water Content of Sulfur Plant Gas Stream

S. SCHWARTZ, *S. Schwartz & Associates, Consulting Engineers, New York, N. Y.*

In plants which recover sulfur from hydrogen sulfide contained in sour natural gas, feed gas is obtained from the stripper of the ethanolamine treating plant. The gas leaving the stripper is cooled to condense out the bulk of the water vapor contained therein and is therefore saturated at the existing condenser exit pressure and temperature. When delivered to the sulfur recovery plant perhaps 500-1,500 ft. away, additional cooling and condensation occurs in the delivery line.

In order to calculate the equivalent sulfur input to the recovery plant it is necessary to know the volumetric moisture content of the saturated gas in order to apply the daily dry-gas analysis. This requires a knowledge of the flowing pressure, usually controlled within narrow limits by instruments, and the average flowing temperature which varies with the gas-flow rate and atmospheric conditions. The average temperature is obtained from recorder charts. The sulfur plant engineer must then calculate the moisture content to obtain dry gas flow, using the ideal gas laws and the steam tables.

In order to eliminate the calculation so that a plant technician can obtain the daily input in a simple and trou-

ble-free manner, the preceding chart has been prepared to eliminate the steam table calculation.

The chart was derived from the simple gas equation, as shown below, where H is the water vapor content of the saturated gas, in percent by volume, p is the vapor pressure of water corresponding to the average gas temperature T (deg. F.), π is the line pressure, both in psia., and A and B are constants:

$$H = p/\pi \quad (1)$$

$$\log p = A/(T + 460) + B \quad (2)$$

Eliminating p and re-arranging,

$$\log H = A/(T + 460) + B - \log \pi \quad (3)$$

It will be observed that for a fixed line pressure the water vapor content will vary with the temperature so that Eq. (3) takes the form:

$$\log H = A/(T + 460) + C \quad (4)$$

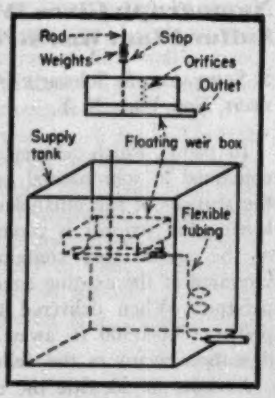
where C is a constant.

A family of straight lines may be drawn on semi-log paper plotting H versus $1/(T + 460)$ for each pressure. However, the reciprocal of $1/(T + 460)$ replotted in terms of T alone gives a non-uniform scale.

The nomograph above reproduces this equation with an accuracy sufficiently close for plant purposes. For example, from the chart, for $T = 90$ deg. F. and $p = 15$ psia., $H = 4.55$ percent, against 4.65 percent calculated. For $T = 150$ deg. F. and $p = 15$ psia., $H = 24.7$ percent against 24.8 percent calculated.

Floating Weir Box Provides Constant Feed Rate

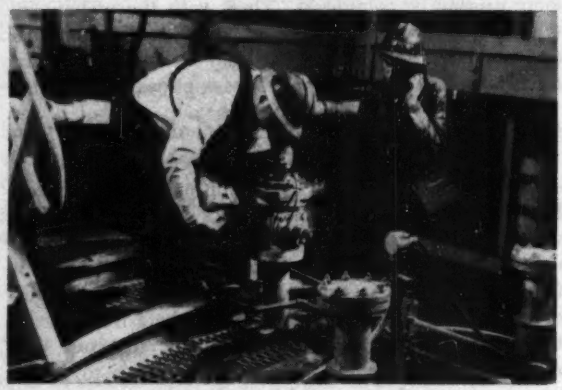
W. H. Decker, *Sinclair Research Laboratories, Inc., Harvey, Ill.*



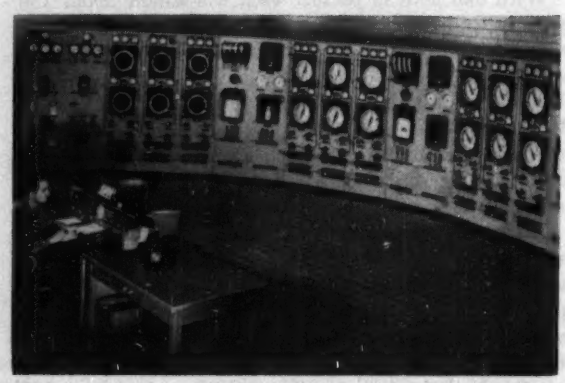
It is often necessary in the field to provide a constant-rate liquid feeder for continuous addition of liquids to an open system. One example of this is the feeding of sulfuric acid or similar chemicals to a circulating cooling water system. While there are a number of devices on the market which can be successfully used, the cost and time required to procure such devices may not be warranted. However, a simple and dependable feeding arrangement can be quickly and cheaply constructed on the job from surplus materials. This suggested feeder eliminates the need for elaborate control systems and regulating valves which may not be dependable for metering and controlling at low feed rates. This feeder also eliminates the problem of varying pressure head across a control valve which is the result of changing liquid head in the supply tank.

The equipment consists of a small tank or barrel provided with an internal floating pan or weir box. This floating pan is connected to the bottom of the tank by means of a length of synthetic plastic tubing. The floating pan should have sufficient displacement so that the weight of the flexible tubing will not affect the submergence of the pan at varying liquid levels in the supply tank. On the sides of the floating pan a series of small holes or orifices is drilled in any desired pattern. Thus by the addition or subtraction of weights in the pan the number of orifices submerged in liquid can be varied, as required. By this method the effects of a variable head across the regulating orifices is eliminated, and the flow can be maintained at a constant rate regardless of the level of the liquid in the supply tank. A small vertical rod installed inside of the floating pan with a fixed stop outside of the main tank can be used to carry the necessary weights. The weights consist of a number of washers of varying size, which can then be added to or taken off of the rod without contact with the liquid in the supply tank.

The sizes of the orifices and their arrangement can readily be changed as needed. It is a simple matter to change the number and amount of weights to vary the feed rate of the liquid used. The selection of the type of synthetic tubing and the materials of construction would be governed by the chemical to be handled.



From Furnace . . .

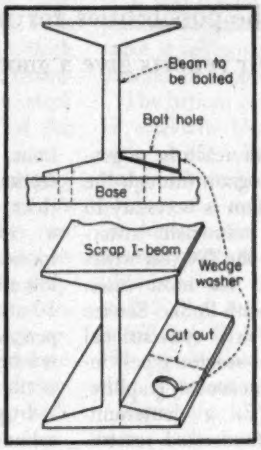


. . . to Control Room

RADIO is used effectively in process control in the new ferrochrome alloy plant of Electro Metallurgical Co. at Marietta, Ohio. Top view shows operators atop one of eight huge furnaces where carbon in the alloy is reduced to a low figure. They are measuring temperatures at numerous points with an optical pyrometer, radioing results with a walkie-talkie to the control room where temperatures are logged.

Wedges Cut From I-Beams Make Good Wedge Washers

ALLEN J. FRITSCHE, *Chemical Engineer, Sinclair & Valentine Co., Ridgway, Pa.*



It is often necessary to bolt an I-beam to a structure, or to bolt equipment supports or pieces of equipment to a beam, rather than to use welding or riveting. When the bolt has to pass through the flange of the beam, then the question of wedge washers arises, since the flanges of I-beams are tapered.

Unfortunately, small plants seldom carry wedge washers in stock, and it is unlikely that they can be purchased locally. However, there is a simple solution to the problem, for there is a ready source of supply in the flanges of scrap I-beams. If we want to bolt down a 6-in. I, then we simply cut out a washer from the flange of a scrap piece of 6-in. beam. This is drilled and inverted on the flange of the I-beam as in the sketch, where the tapers have been exaggerated for clarity. Such a washer serves the purpose very well, and the same method can be used with channel iron.

Simplified Method for Sizing Gas Heat Exchangers

A. DEVORE, *Rating Dept. Head, Davis Engineering Corp., Elizabeth, N. J.*

This article presents simplified heat transfer and pressure drop equations for gases in segmentally baffled flow, together with the more general dimensionless equations from which they were drived.

McAdams[1] has shown that a considerable simplification of the general dimensionless equations for heat transfer is possible where gases are concerned. This comes from the facts that (1) the Prandtl number of most gases approximates 0.78 and is independent of temperature and pressure; (2) viscosities of common gases vary only slightly with temperature and pressure. McAdams[1] recommends an average value of 0.02 centipoises; and (3) viscosity enters the heat transfer equations as a fractional power.

McAdams[2] derived a simplified equation for gases flowing inside tubes, using these assumptions. However, similar expressions have not been available for segmentally baffled flow. The second and third simplifying factors above should also lead to simple expressions for gas pressure drop.

NOMENCLATURE

C_p	Specific heat, Btu./(lb. deg. F.).
D_e	Slit width = $P - D_o$, inches.
D_o	Outside tube diameter, inches.
f	Fanning factor, dimensionless.
g_c	Dimensional constant in Newton eq., $F = ma/g_c$.
G_b	Mass velocity through baffle window, lb./(sec. ft.^{2}).
G_s	Mass velocity at min. cross section area, lb./(sec. ft.^{2}).
G_t	Geometric mean mass velocity = $(G_s G_b)^{1/2}$.
h	Film coefficient of heat transfer, Btu./(hr. ft.^{2} deg. F.).
k	Thermal conductivity, Btu./(hr. ft.^{2} deg. F./ft.).
N_R	Number of rows in cross flow.
N_B	Number of baffles.
V	Velocity, ft./sec.; V_{max} is evaluated at min. flow area.
S	Specific gravity, dimensionless.
P/D_o	Pitch-diameter ratio, dimensionless.
ΔP_F	Frictional pressure loss, lb./in.^{2}.
ΔP_{NF}	Non-frictional pressure loss, lb./in.^{2}.
μ	Viscosity at bulk temperature, lb./(sec. ft.).
μ_w	Viscosity at tube wall temperature, lb./(sec. ft.)
ρ	Density, lb./ft.^{3}.

HEAT TRANSFER

Donohue[3] recommends for commercial shell-and-tube exchangers the dimensionless equation:

$$\frac{h D_o}{k} = 0.25 \left(\frac{D_o G_s}{\mu}\right)^{0.6} \left(\frac{C_p \mu}{k}\right)^{\frac{1}{3}} \left(\frac{\mu}{\mu_w}\right)^{0.14} \qquad (1)$$

which simplifies to:

$$h = 32.4\, C_p\, G_s^{0.6} / D_o^{0.4} \qquad (1a)$$

Eqs. (1) and (1a) apply to staggered tube banks, with $P/D_o = 1.25$ to 1.50. For banks of in-line tubes (square pitch), use 80 percent of the above value for h[4]. For transverse, low-finned tubes use 70 percent of the h value computed from Eq. (1a)[5].

Evaluation of G_s involves the geometry of the tube layout. The original papers of Donohue[3] and Williams & Katz[5] should be consulted for this purpose.

PRESSURE DROP

The Chilton-Genereaux equation for pressure drop normal to staggered tube banks[6] is:

$$\Delta P_F = 4 f N_R\, V_{max}^2\, \rho / 2 g_c \qquad (2)$$

where $f = (D_o\, V_{max}/\mu)^{-0.2}$. This applies to turbulent flow with $P/D_o = 1.25$ to 1.50. For in-line flow multiply ΔP_F by 0.44[7].

A comparison of Eq. (1) with the Colburn equation for flow normal to staggered tube banks[4]:

$$\frac{h D_o}{k} = 0.33 \left(\frac{D_o G_s}{\mu_{ave}}\right)^{0.6} \left(\frac{C_p \mu}{k}\right)^{\frac{1}{3}}$$

yields a "bundle-penetration" as defined by Donohue of 63 percent, since $0.33\ (0.63\ G_s)^{0.6} = 0.25 (G_s)^{0.6}$. Accordingly, with 63 percent bundle-penetration, Eq. (2) simplifies to:

$$\Delta P_F = (2.44 \times 10^{-3})\, G_s^{1.8}\, N_R / \rho\, D_o^{0.2} \qquad (2a)$$

The non-frictional loss through the baffle window is calculated[3] as an orifice loss with a discharge coefficient of 0.7:

$$\Delta P_{NF} = 0.01372\, V_B^2\, S N_B$$

where V_B is in ft. per sec. Alternatively, this may be written in terms of the more convenient mass velocity as:

$$\Delta P_{NF} = G_b^2\, N_B / 4{,}630\, \rho$$

REFERENCES

1. McAdams, W. H., "Heat Transmission, 2nd Ed., p. 174, McGraw-Hill, New York, 1942.
2. Perry, J. H., "Chemical Engineers Handbook, 3rd Ed., p. 467, McGraw-Hill, New York, 1950.
3. Donohue, D. A., *Ind. Eng. Chem.*, 41, 2499-2511 (1949).
4. Colburn, A. P., *Trans. AIChE*, 29, 174-210 (1933).
5. Williams, R. B., and Katz, D. L., "Performance of Finned Tubes in Shell and Tube Heat Exchangers," Eng. Res. Inst., Univ. Mich., Jan. 30, 1951.
6. Chilton, T. H., and Genereaux, R. P., *Trans. AIChE*, 29, 165-7 (1933).
7. *Ibid.*, p. 171.

Industry Teams Report on A-Power—I

Four industry teams including chemical and utility companies have been studying the possibilities for industrial atomic power. Now released, their reports give a good idea of what to expect.

NOTE—*This is the first of two articles summarizing recently declassified information on the four industry-team studies of atomic power potentialities.* This month we review the reports of the Commonwealth Edison Co.-Public Service Co. team; and the Dow Chemical Co.-Detroit Edison Co. team. Next month will bring a similar treatment of the Monsanto Chemical Co.-Union Electric Co. team; and the Pacific Gas & Electric Co.-Bechtel Corp. team.*—EDITOR.

Since summer of 1951 four industry teams have been cooperating with the A.E.C. in making feasability studies on the industrial production of power by the use of nuclear fission. A fifth team, recently added to the list, has not yet reported. Although the general conclusion is that industrial nuclear power is still a few years in the future, all of the teams reported cautious optimism. Working from information made available by A.E.C., each team made its own preliminary designs and its own independent study of economics and practicability. All of these studies show evidence of much originality. All conclude that at the present high cost of reactors, a government support program through the purchase of plutonium is necessary to make such power industrially attractive, at least during the five-year write-off period assumed for most cases.

The Commonwealth-Public Service team considered fairly conventional thermal non-breeder reactor types, including (1) a helium-cooled, graphite-moderated; and (2) a deuterium-cooled, deuterium-moderated reactor. The Dow-Detroit Edison team came up with the least conventional suggestions, dealing with several modifications of a fast breeder reactor, cooled with liquid sodium and handling fuel through both reactor and processing cycles in mobile form as molten metal, metal slurry, or fused salt. The Monsanto-Union Electric study was concerned mainly with two modifications of a sodium-cooled, graphite-moderated thermal reactor using enriched uranium; and the Pacific Gas-Bechtel study with (1) a heavy-water-moderated thermal reactor using natural uranium fuel and light-water cooling; and (2) a fast breeder reactor using enriched uranium and liquid-metal cooling.

Commonwealth Edison-Public Service Report

This team chose as the primary objectives the production of plutonium and electric power through the use of natural uranium fuel, with maximum utilization of already proved reactor technology. The study was concerned with two reactor types: (1) a gas-cooled, graphite-moderated reactor based on experience at Brookhaven and Hanford; and (2) a heavy-water-moderated, heavy-water-cooled reactor based on experience at Argonne National Laboratory.

GAS-COOLED REACTOR

This reactor is designed for 350 megawatts heat output and consists of two right circular graphite cylinders with adjoining faces parallel to each other on the same center line. These cylinders contain natural uranium slugs arranged in a lattice. The slugs in their channels are cooled by helium entering the system through a small gap between the cylinders and flowing outward through the two reactor sections. The two cylindrical reactor-core sections, 35 ft. in diameter and 10 ft. thick, are of graphite enclosed within a 44-ft.-diameter spherical vessel formed of 1.67-in. SA 204 Grade B low-alloy steel, designed to operate at 10 atm. and 750 deg. F. Around the periphery of each cylindrical section is a belt of lower grade graphite acting as the reflector.

In previous reactors of this type the cylindrical uranium fuel slugs have been encased in aluminum, not suitable for higher temperature extraction of heat for power. The proposed design contemplates slugs of uranium metal with a central hole, and provided with fins which rest on the surfaces of the slug channels in the reactor core. Maximum internal metal temperature would be limited to 1,000 deg. F. to prevent transformation into the beta phase. A special alloy casing, already tested preliminarily, would be used. Advantage could be gained if an alloy and method of casing could be developed which would permit increasing the fuel element internal temperature above 1,200 deg. F., at which point the phase transformation of uranium occurs.

Helium is suitable as a heat-transfer gas since it is inert and has zero neutron absorption cross-section. Since pumping power requirements for circulating the gas are proportional to the volume, pressurizing the helium to 10 atm. materially decreases the power required to transfer a fixed quantity of heat.

The spherical vessel which encloses the reactor is provided with openings for introducing and removing the uranium and the helium. There are also control-rod and instrument openings. The entire outer surface of the sphere is sand-blasted and is then metal sprayed with a 70 percent silver-30 percent cadmium alloy, which reduces neutron-flux leakage at the surface of the sphere. The same treatment is applied to the helium piping.

*A subcommittee of the A.E.C.'s Advisory Committee on Industrial Information, consisting of Andrew W. Kramer of *Power Engineering* magazine, and Stanley A. Tucker of the A.S.M.E., prepared the declassified versions of the original industry-team reports. These represented about one-quarter to one-third of the bulk of the original material. As presented here the declassified versions are further condensed to about one-quarter of the material released on May 31 by the A.E.C.

For protection of operating and maintenance personnel from radiation during reactor operation, or after shutdown, the entire sphere is enclosed in an 8-ft.-thick radiation shield made of crushed-limestone-aggregate concrete. Inner surfaces of the shield walls and floor are covered with 6-in.-thick cast-iron plates. The air inside the radiation shield is vented to a stack which maintains the interior of the shield under negative pressure.

The reactor is designed for charging and discharging without shutdown. A charging machine which handles two channels simultaneously is provided to introduce fresh uranium and to drop the irradiated slugs out of the core on the far side of the reactor. These accumulate at the bottom of the sphere and are removed to a water-filled storage canal through an opening with pressure locks.

Reactor instrumentation measures power level, reactor period, and temperature and pressure of the heat-transfer medium. The major control function is the operation of the control rods by manual and semi-automatic equipment. There are also protective devices which provide automatic shutdown when excessive levels of radiation, power or temperature are attained. Control rods enter through the top of the sphere and are automatically positioned to maintain constant helium temperature at the boiler inlet. In addition, eight vertically mounted boron-steel safety rods are provided to drop into holes in the reactor graphite in the event of various emergency conditions such as too high a temperature or neutron density, pressure loss through helium leakage, or auxiliary power supply failure. However, this reactor has a negative temperature coefficient which tends to make it self-protecting in event of reduction or stoppage of coolant flow.

The helium coolant system includes 12 axial-flow blowers of 75,000 cfm. each, half motor-driven and half steam-turbine-driven. Helium is circulated at the rate of 1,106,000 cfm. (at blower inlet) at 10 atm. static pressure, with the blowers developing a head of 6 psi. Helium leaves the pile at 742 deg. F., entering the boilers at 650 deg. F. It leaves the boilers at 384 deg. F., and returns to the pile, after compression, at 403 deg. F.

There are 12 separate helium circuits, each consisting of the duct work, a boiler, and a blower. These boilers are of the straight-through type with economizer, generator and superheater sections combined in one continuous path. Ten of the boilers could carry the load, producing a total of 906,000 lb. of steam per hour at a pressure of 250 psig. (396 deg. F. sat. temp.), superheated to 525 deg. F. The boilers have shells 13 ft. in diameter by 23¼ ft. long, containing 48 ordinary steel tubes of 1 in. O.D., formed into a bundle of hairpin loops.

Although the helium does not become radioactive, it might contain particles of active material and so the helium circuit is shielded with removable 2-ft.-thick concrete blocks to permit maintenance. No radioactivity is transferred from the helium to steam in the boilers. Part of the helium is continuously purified. An underground storage tank area occupying 45 acres is used to store the helium. The system is calculated to provide a total input to the boilers of 1,085,000 Btu. per hour, producing 906,000 lb. of steam per hour. About 82.5 percent of this steam goes to the turbo-generator, the rest to auxiliaries. This results in a gross generation of 61,700 kw., of which 15,000 kw. is required for auxiliary power purposes and 46,700 kw. is the net power output of the plant.

The general arrangement of the plant, indicated in Fig. 1, shows a boiler-reactor building about 240 ft. long, 100 ft. wide, and 60 ft. high. An open deck, 80 × 40 ft., is used for the turbine area. Under-water storage for the irradiated fuel occupies a 20,000-sq. ft. area, 40 ft. deep, on both sides of the turbine platform. The total cost of such a plant, as estimated in Table 1, runs to about $40,000,000. However, fuel element fabrication and chemical processing facilities for plutonium extraction are not included in these costs.

LIQUID-COOLED REACTOR

The design suggested for the liquid-cooled reactor uses heavy water (D_2O) as the heat transfer medium, moderator and reflector. The fuel assembly is composed of a num-

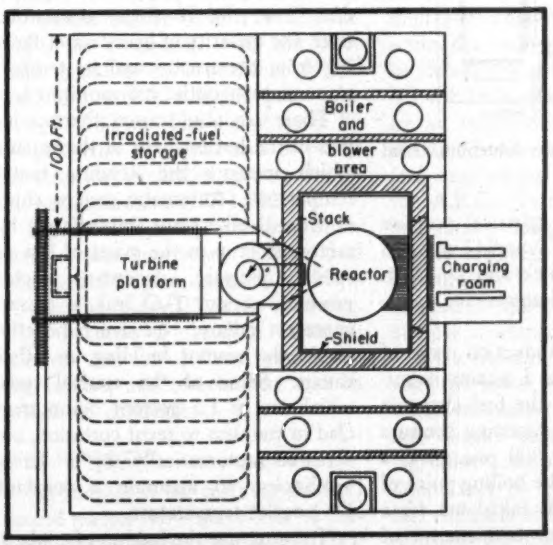


Fig. 1—Plant layout for CEPS helium-cooled reactor.

Table I—Estimated Installed Cost of Power Reactors

(Reported by Commonwealth Edison-Public Service team)

	Total Cost, $	
	Gas-Cooled Reactor[1]	Deuterium-Cooled Reactor[2]
Reactor	7,700,000	3,846,000
D_2O system	.....	3,172,000
D_2O, $82/lb.	.....	41,000,000
Helium system	1,650,000	230,000
Steam-gen. plant	4,025,000	4,178,000
Turbo-gen. plant	4,305,000	14,285,000
Miscl. power plant eq.	.....	342,000
Electric plant	975,000	4,513,000
Transmission plant	750,000	1,000,000
Stack, 500 ft.	500,000	.....
Water system and wells	200,000	.....
Buildings	4,200,000	10,024,000
Site (minimum)	50,000	125,000
Other land costs[3]	1,500,000	1,500,000
Yard improvements	225,000	830,000
Miscl. (tools, parts)	950,000	950,000
Temporary const.	.....	960,000
Research, development	1,500,000	2,500,000
Contingencies	4,420,000	8,700,000
Engineering, 5%	1,700,000	4,500,000
Total direct cost	34,650,000	102,655,000
Overhead, 15%	5,350,000	15,345,000
Grand total	40,000,000	118,000,000

[1] 46,700 kw. net output. [2] 211,500 kw. net output. [3] Team recommends 2,400 acres owned. Reactor Safeguard Comm. formula suggests 70,000 acres ($42,000,000) to be owned.

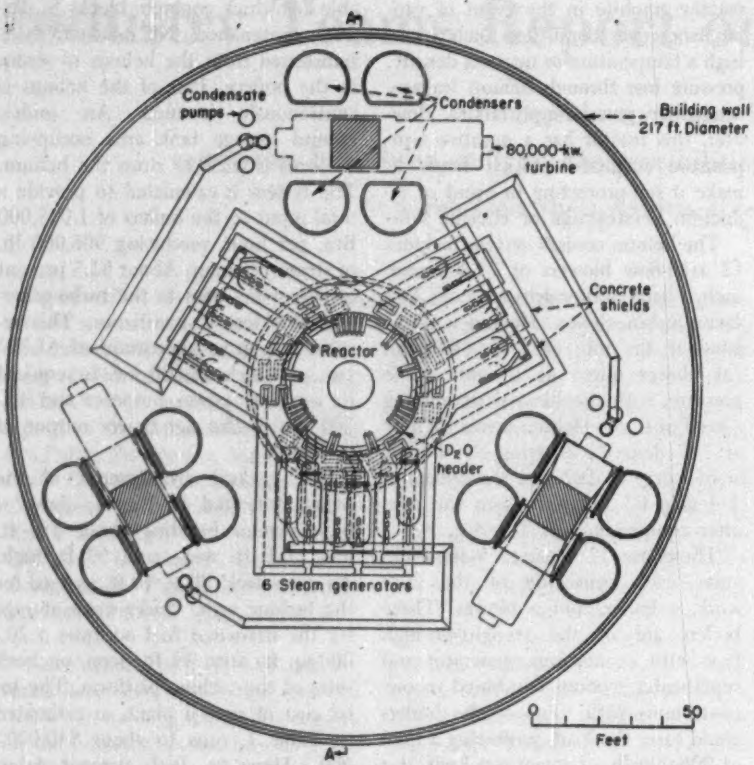


Fig. 2—Plant layout for Commonwealth Edison-Public Service deuterium-cooled reactor, shown in cross section in Fig. 3.

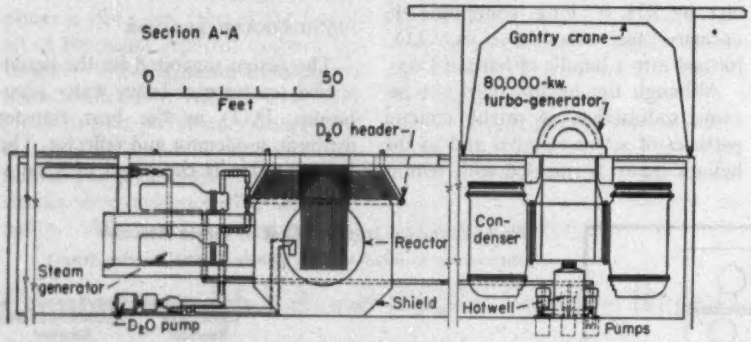


Fig. 3—Sectional elevation for Commonwealth Edison-Public Service deuterium-cooled reactor plant, designed for net power output of 211,500 kw.

ber of separate fuel elements each consisting of an assembly of uranium elements in a thin metal casing. These fuel assemblies are placed in cylindrical channels arranged vertically, through which heavy water is pumped. The heavy water flows upward through the fuel channels and also between the fuel channels. That part which is between them acts as a moderator, traveling relatively slowly and discharging from the reactor through the control rod assemblies. The reactor core is essentially a right cylinder contained in a spherical pressure shell. This shell, of Type 347 stainless steel, is 2.14 in. thick and 20.33 ft. in diameter. It is designed for operation at 800 psia.

With a heat production rate of 1,064 megawatts and a maximum surface temperature of the fuel elements of 465 deg. F., an operating pressure within a reactor of 800 psia. gives a safe margin below the boiling point of D_2O. This reactor is calculated for a maximum deuterium temperature of 440 deg. F., and a coolant flow at maximum load of 303.3 cu. ft. per sec., giving a flow velocity of 25 cu. ft. per sec. through the fuel element tubes.

In this particular design it is necessary to shut down the reactor 12 hours before charging and discharging operations. These operations make use of a traveling crane and a lead "coffin" which is a 4.25 ft. O.D. × 18 ft. high cylindrical shell constructed of lead and lined with ¼-in. steel. This device is used to lift out the spent fuel elements and carry them to a water-filled trench from which they are discharged and transported under water to the storage and shipping area. Fresh fuel elements placed in the coffin are then lowered into position in the reactor.

The reactor shield is made of 8-ft.-thick reinforced concrete, with limestone aggregate. Inner and outer surfaces of the shield are lined with steel. The top surface of the upper shield forms the charging floor. Elsewhere, around the steam generators, piping and pumps, and miscellaneous storage tanks, there is a 3-ft. concrete shield.

Provision is made to helium-blanket any part of the system where an interface exists in the D_2O circuit. For example, the reactor is pressurized with helium.

Heavy water for the plant (including an 11-percent reserve) amounts to about 7,220 cu. ft. cold. It enters the bottom of the reactor shell at about 388 deg. F., and at the rate of 64.5 million lb. per hour. It flows upward through the fuel tubes and control rod openings to manifolds which conduct it to the 18 steam generators. Both the quantity of heavy water flowing from the reactor and its temperature at each outlet are monitored.

There are also several thermocouples in the hottest parts of the reactor which measure the uranium metal temperature. Automatic reactor shutdown will take place immediately by safety-rod drop in the event of loss of sphere pressure, excessive reactor power, a serious D_2O leak, a steam-generator failure, excessive radioactivity in the reactor building, or other causes. Some of the control rods, which are of 1.5 percent boron steel clad in stainless to resist corrosion, are actuated automatically by a servomechanism to maintain a constant D_2O outlet temperature.

To minimize the holdup of coolant, the length of piping is minimized by

arranging the 18 steam generators in a tight circle around the reactor as shown in Fig. 2. The 211 individual fuel-element and control-rod headers connect to a ring header from which 12-in. individual headers connect to the steam generators. Thus, one, several or all of the steam generators may be operated at once. For a heat output of 1,064 megawatts, the design calls for a capacity of 180,000 lb. of 180-psia. saturated steam per hour from each of the 18 generators. These are arranged in pairs to reduce the number of coolant pumps and valves. Each generator is about 24 ft. long, with the largest part of the shell 88 in. in diameter. Each is tubed with 656 U-tubes of $\frac{5}{8}$ in. O.D. stainless steel, for a total area of 3,975 sq. ft.

The nine coolant circulating pumps operate under a suction pressure of 650 psia. and discharge at 800 psia. Three are driven by 2,300-hp. steam turbines and six by 2,000-hp. motors. Each handles 7.2 million lb. per hour of D_2O. They are single-stage, overhanging-impeller, stainless-steel centrifugal pumps, with special D_2O sealing and cooling of the gland.

Four storage tanks, with a total capacity of 62,000 gal., are provided for dumping all coolant. These tanks, lined with stainless steel and supplied with a helium blanket to minimize contamination, are part of a coolant makeup system which includes filters and a demineralizer.

The three turbo-generators, each rated at 80,000 kw., are designed to operate on 175-psia. steam at 371 deg. F., exhausting at from 1 to 2.5 in. Hg in the condenser. With the lower back pressure, each produces 84,700 kw., and with the higher back pressure, 77,300 kw. The use of steam by steam-driven auxiliaries and of power by electrical auxiliaries reduces the total net generation to 211,500 kw.

Fig. 2 shows the arrangement of reactor, steam generators, turbines and condensers in plan, installed within a circular building 217 ft. in diameter. Fig. 3 shows a sectional elevation through one set of steam generators, the reactor, and one turbine and its associated condensers.

COST ESTIMATES

An analysis of the costs for the D_2O cooled reactor show that about 40 percent of the overall cost is for D_2O; 20 percent for the reactor, including the D_2O system, controls, additional land and site development; and 40 percent for the turbo-generator plant. The total investment of $118,000,000 could be reduced about $47,000,000 if the reactor were designed for light-water cooling and moderation. However, this would require the use of enriched fuel. The cost per kilowatt of electric generating capacity could thus be reduced from $492 to $297. These costs are summarized in Table I. On the basis of this team's study, in the light of the present status of reactor technology, the conclusion was that the heavy-water reactor has the best economic possibilities. However, there are important uncertainties in the availability and cost of heavy water and the practicability and cost of a chemical plant to process fuel elements. There would be considerable advantage in the use of light water for moderator and coolant if sufficiently enriched uranium were available. But this presents uncertainties.

The team felt that the gas-cooled reactor could provide a substantial beginning in atomic power with a minimum of interference with production reactors now under construction or contemplated. It felt, too, that both reactor designs described were feasible from engineering and operating standpoints, and that, assuming the availability of materials, research facilities and manpower, the gas-cooled reactor might be in trial operation by the fourth, and the D_2O-cooled reactor in operation by the fifth year after authorization.

Looking toward the future, the team felt that the ultimate type of reactor for power generation would depend largely on whether plutonium or other fissionable material was needed for military purposes, or whether power generation alone would be required. Present reactors, it was pointed out, are limited to relatively low coolant temperatures and therefore to a low thermal efficiency for the steam cycle. Low burn-up of fuel, only about 0.1 percent of total fuel, is inherent in existing types. Considering these facts, the belief is that future reactors should be designed for higher temperature operation, that they should produce more fissionable material from existing source material, and that they should allow higher burn-up rates. New operation techniques should be developed which would permit complete utilization of the fuel material without requiring removal of fuel.

Dow Chemical-Detroit Edison Report

The ultimate promise in breeder reactors and the chance of major reductions in reactor and processing costs encourages the belief that we shall have competitive nuclear power some day, although this cannot yet be demonstrated. Acting on this belief the team developed specifications for an economical reactor, later proposing a further development program and engineering study, jointly with the A.E.C. This would develop the preliminary design for a fast breeder reactor involving a high coolant temperature and liquid fuels, closely integrated with an improved metallurgical separations process.

With the second phase of the program in mind, the team continued work, concentrating on design of a fast breeder using liquid-metal cooling, but compromising the ideal liquid fuel by employment of solid fuel elements of a uranium alloy. The plan is to use uranium, either metallic or an alloy, in the breeder blanket to produce plutonium. Eventually, the team expects that liquid fuels such as uranium eutectics, slurries of uranium alloys in low-melting alloys, or fused salts may be feasible. However, the solid-fuel design is now going ahead.

The team came to certain conclusions regarding an economical power reactor. It should use low-cost fuel and should be a breeder converting thorium or depleted uranium into fissionable material for fuel. A breeder here is taken to mean a reactor which produces more fissionable material than it burns, whether the same or a different material. It should be a fast-neutron reactor, operating at high temperature—in the range of 950 to 1,100 deg. F. in the core. It should permit fast, low-cost recovery of fissionable material and fission products. It should be inherently self-regulating, should use a mobile or fluid fuel, and should require a minimum exclusion (isolation) area.

Considering known reactor tech-

nology, the team felt that the more conventional designs (e.g., thermal reactors with graphite or D_2O moderators) would not permit a high enough rate of heat removal to give either high power level or high rate of plutonium production. Efficient power production requires a relatively high coolant temperature. Production of power and weapons material will be compatible only when the coolant exit temperature is high enough for efficient power recovery at or near optimum materials production conditions. Furthermore, for commercial power production the team felt that breeding would be necessary to enable the sale of surplus fissionable material to provide the margin necessary to offset the high cost of power reactors.

The expense of fixed fuel elements and their limitations, the difficulties of charging and discharging them, the aqueous separations process, and excessive waste volumes, are large factors in nuclear economics. All these problems indicate the need for a fluid fuel and closer integration of reactor and the separations and decontamination processes. These could greatly improve the outlook for nuclear power. It seems likely that molten metal processes can be developed into superior separations processes, saving much expense particularly if the machining and jacketing of fuel slugs can be avoided. It appears that the most desirable fuel is one that can be maintained in the liquid state at all times. Barring this, solid fuel elements should be capable of simple fabrication, e.g., casting.

Eventually it should be possible to utilize liquid fuels such as uranium eutectics at temperatures of about 500 deg. C. or higher, or else lower their melting points still further. However, for this, much development work will be required so that to permit design of a reactor that can be built in a reasonable time, solid fuel is preferred at present.

Present safety rules governing the exclusion area may eventually be revised downward with further experience and changes in practice, such as continuous removal of products from the reactor. However, such a large area is now required as to make the location of a plant difficult in many built-up power markets. In the Detroit area, the cost of exclusion area alone would amount to half the total cost of a steam plant of the same power capacity. And distribution costs would be a serious factor if a plant were located in a remote section of the distribution territory. One possible solution in some cases is the location of the plant off-shore in a body of water adjacent to the distribution territory. This would involve mounting the reactor and appurtenances on a barge or ship which would be floated to the location and there sunk or anchored. Savings possible this way, along with reactor improvements, might make the heat delivered competitive with coal.

The team considered several reactor types which are summarized in Table II. All are intended to use molten sodium as the coolant. Type B, which has a high percentage of desirable characteristics, is the one to be investigated initially. Type A-1 is a liquid-fuel reactor with fuel in a pot and coolant in tubes. Not shown is a similar type with the liquid or mobile fuel, rather than the coolant, in tubes. Type C is a jet-mixed, centrifugally separated, liquid-cooled breeder reactor with liquid fuel and continuous reprocessing. It would incorporate all the most desirable ultimate objectives. It would not have conventional heat transfer surfaces, would have a core entirely of molten metal, would use depleted or natural uranium as the fertile material, or in some cases thorium, U-233 or U-235, depending on safety requirements.

The three A-type reactors in the table are variations of the idea of molten fuel with liquid coolant in tubes. Here the container-material is critical. The problem might be somewhat alleviated by flowing the fuel in and out of the pot in the molten state, but holding it at somewhat lower temperature as a solid during most of the time in the reactor. This is the system of the B-type reactor.

An economic analysis of reactor steam plants was made, in comparison with latest data on conventional steam plants. From this it appeared that if a nuclear steam generating plant can be designed to compete economically with present boiler plants, it will affect not more than 15 to 20 percent of the overall electric system cost in the case of large utilities. This means that existing boiler plants will not become immediately obsolete, and that even the less efficient steam plants, which might be replaced with reactors, would still be useful for peaking or reserve capacity. To equal coal of 11,800 Btu. per lb., delivered at $7.20 per ton, a reactor would have to supply steam to the turbine throttle at a total cost less than 59.6 cents per million Btu. to be presently competitive. Without cost for fuel, labor, materials or supplies a reactor that would be economically sound for 20 years would justify an investment of about $235 per kw. capacity; but since these costs do exist, and high obsolescence is a factor, the justifiable investment for a reactor would be correspondingly reduced.

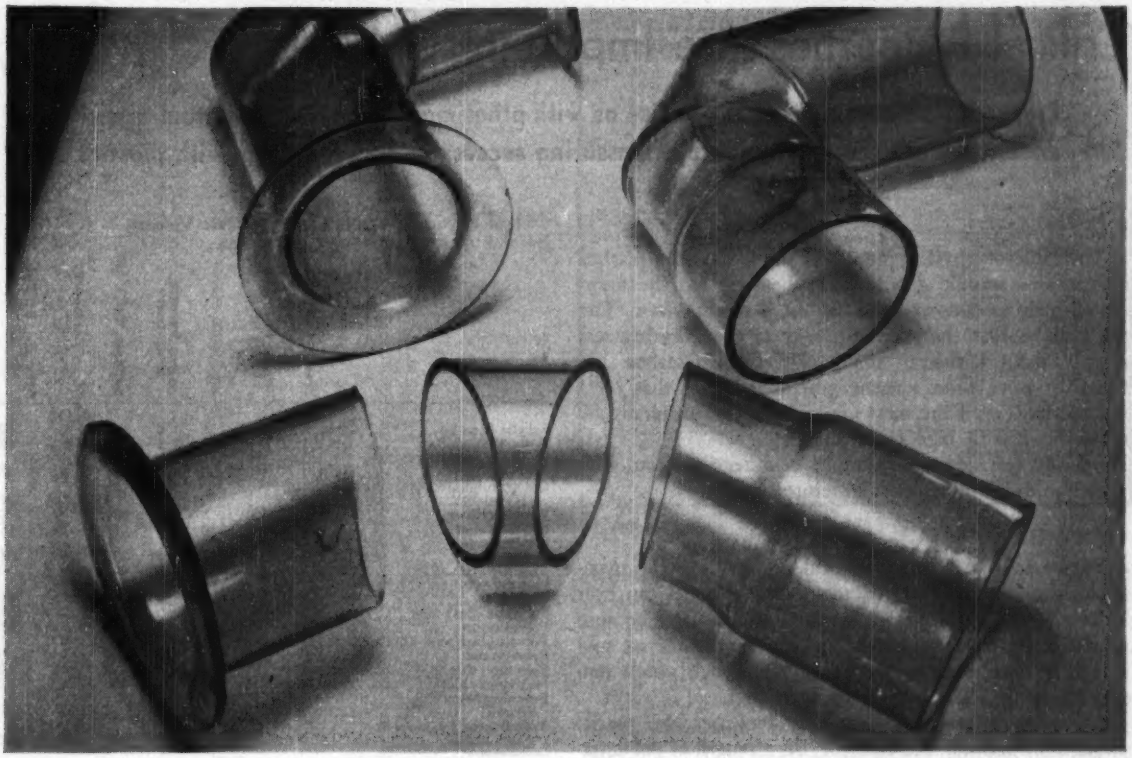
Although the report offered a preliminary design for a heavy-water-moderated reactor using normal uranium, and designed for liquid-metal cooling as well as improved and more closely integrated separations processes, the conclusion was that as much time and development expense would be required on the improvements as would be needed to develop the fast breeder reactor with its low cost and virtually unlimited availability of fuel.

Table II—Characteristics of Several Reactors

(Reported by Dow Chemical-Detroit Edison team)

All reactors reported have molten sodium coolant, melting at 98°C. and boiling at 883°C. Thermal conductivity for Na is 0.15 cal./(cm., sec., °C.) and volumetric specific heat (density × sp. ht.) is 0.24 cal./(cm.³, °C.). In all reactors maximum coolant temperature is limited by corrosion. Specific power is limited in reactors A-1 and A-3 by fact that high heat release per unit of fuel volume requires extremely small fuel elements or large temperature drop. Specific power of reactors A-2, B and C is limited by volumetric specific heat of the coolant.

Reactor type	A-1	A-2	A-3	B	C
Reactor description	Radiator, liquid fuel	Radiator, slurry fuel	Radiator, liq. fuel, solid fert. material	Radiator, solid fuel	Liq.-Liq., liquid fuel
Max. kw. heat output	25,000	400,000	75,000	450,000	220,000
Max. available coolant temp., °F	900	1,020	900	1,020	930
Power output, kw. at 30% efficiency	7,500	138,000	22,500	135,000	66,000
Max. coolant vel., fpm	30	30	10(30)	30	30
Coolant min. temp., °C	350	350	340	270	200
Coolant temp. rise, °C	130(260)	130	140	280	300
Coolant max. temp., °C	480(610)	480	480	550	500



INDUSTRIAL PLASTICS

Anticipated growth in the plastics industry stems from the fact plastics can do many jobs better than the older materials. Comparative properties and industrial experience are guides to intelligent selection which are covered in this report.

W. M. BRUNER AND P. J. WAYNE

CHEMICAL ENGINEERING REPORT—JULY 1953

Widespread attention is being given to the selection and fabrication of new materials to control the corrosive action of plant streams. The annual cost of corrosion in this country seems to be well documented and is said to be $5½ billion.[1,2] A saving of just 1 percent of that corrosion cost comes to $55 million.

Recently plastics have taken a place beside metals as materials of construction as it becomes more evident that there are many jobs they can do better than metals. These uses account in part for the tremendous expansion that is anticipated in the plastics industry, and they provide a market for the new plastics expected in the years ahead.

Many plastics have been used for only two or three years, in duct work, tanks, linings, piping, and in similar applications. There is no backlog of experience and there are no handbooks to guide their use. To make full use of the advantages of plastics we must try to meet the need for information about them. This article is intended to be a step in that direction with a review of some critical properties and examples of actual plant structures.

W. M. Bruner and P. J. Wayne *are chemical engineers with the research division, Polychemicals Dept., E. I. du Pont de Nemours & Co., Wilmington, Del.*

MAJOR COMMERCIAL PLASTICS

First, what are the major plastics? The table on p. 195 is a list of commercially available plastics now used in plant structures. The list is not intended to be complete, but rather to give the representative types. In some cases—such as polyvinyl chloride, phenolic resins, and polyester glass fiber—there are many brands and suppliers. In others, such as tetrafluoroethylene resin and chlorosulfonated polyethylene there is only one in this country. Certain elastomers are also included because of their value in corrosive service.

Critical Properties Are Important Guides

Properties determine uses of plastics as with other materials. Next to actual experience, they are the only guide posts assuring successful cost reduction with plastics.

SPECIFIC GRAVITY

The table of physical properties shows how the plastics compare in specific gravity. The heaviest are the fluorinated hydrocarbons and the lightest is polyethylene. The table shows that the specific gravity of even the heaviest is only about ½ that of stainless steel. Significance: the factor of price times specific gravity indicates that on a volume basis even the most expensive plastic materials are competitive with base metal alloys.

Specific gravities are important in other ways too, such as in the design of support structures.

TENSILE STRENGTH

Shown in the table of physical properties is the maximum load per unit area of cross section plastics can bear before failure. The word "maximum" is used because plastics, like other materials, can fail in service at substantially lower stresses—for example, through notch sensitivity, or by stress fatigue, or by impact.

Fibrous reinforcement markedly increases the tensile strength of plastics. For example, the strength of polyester-glass fiber is just about in the range of steel. This is due to the glass fibers and not the strength of the polyester. Of the non-reinforced resins, polyethylene terephthalate film and nylon have quite a high tensile strength. The other plastics are below 10,000 psi. Nevertheless, despite low tensile strength many commercial plastics do very well in piping and in structures made from sheeting where low stresses exist.

FLEXURAL FATIGUE

Flexural fatigue stress is plotted against the number of cycles to failure for a few plastics. The method of determining these data is ASTM D671. Fatigue, of course, occurs in all materials subjected to cyclic stresses. This means that failure can result from stresses much smaller than the ultimate strength as obtained by a static tensile strength test. For ferrous metals as well as many plastics, there is a stress limit below which an indefinite number of stress cycles can be endured without failure, i.e., the plot of stress against number of cycles becomes asymptotic. The stress at the asymptote is known as the fatigue or endurance limit. Thus, in the case of acrylic resin shown here, the endurance limit is 3,000 psi. at about 1½ million stress cycles. In design of structures with plastics, as with metals, it is important to design within the endurance limit and not be guided only by the tensile strength.

The flat curve for tetrafluoroethylene resin is especially interesting. This means that below an endurance limit of 1,000 psi., this resin can be flexed indefinitely. And in actual experience, well-fabricated structures of tetrafluoroethylene resin show outstanding flex durability.

Critical Physical Properties (Approximate Values)

	Specific Gravity	Tensile Strength, Psi. × 10³	Elongation, Percent	Impact Strength, 25° C.-Izod	Stiffness, Psi. × 10⁵	Water Absorption, Percent	Max. Service Temp., Deg. C.
Acrylic (Lucite)	1.2	7.0	1.5	0.4	360	0.275	100
Buna N-Buna S	1.1	5.5	40	0.8		0.325	75
Cellulose acetate butyrate (Tenite)	1.1	5.0	50	3.3		1.5	75
Chlorosulfonated polyethylene (Hypalon)	1.1	3.5	220		5	0.325	110
Furane (Haveg 60)	1.7	4.0	0.37	0.5	900		150
Hard Rubber	1.2	7.5	3			0.75	60
Neoprene	1.35	3.25	500				
Nylon	1.1	11.0	45	1.4*	290	1.5	130
Phenolic (Haveg 41)	1.7	4.5	0.37	0.6	900		130
Polychlorotrifluoroethylene (Kel-F)	2.1	6.0	35	3.5		0	200
Polyester-glass fiber	1.8	41		30.5		0.275	215
Polyethylene	0.9	1.8	200		20	0.1	70
Polyethylene terephthalate	1.38	17-25	100			0.3	
Polystyrene	1.0	7.0	2	0.2	340	0.3	80
Polyvinyl chloride—plasticized	1.25	2.25	325		10	1.25	65
Polyvinyl chloride—rigid	1.35	8.5	150	0.5	440	0.5	70
Polyvinylidene chloride (Saran)	1.75	5.0	0.2	1.9	50	0.45	80
Tetrafluoroethylene resin (Teflon)	2.3	2.0	105	4.5	50	0	285

*Nylon 10001

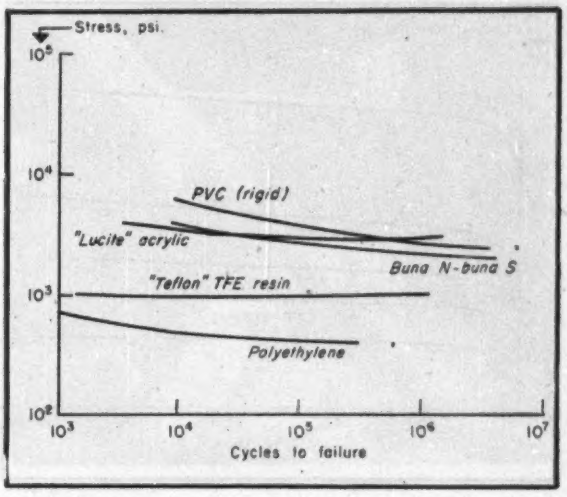
Effects of Aqueous Acid and Alkaline Solutions on Plastics, % Weight Gain, °C.

Plastic	Exposure, Months	30% H_2SO_4 25°	30% H_2SO_4 70°	10% HNO_3 25°	10% HNO_3 70°	10% HCl 25°	10% HCl 70°	10% NaOH 25°	10% NaOH 70°	10% NH_4OH 25°	10% NH_4OH 70°	10% NaCl (pH = 1) 25°	10% NaCl (pH = 1) 70°
Tetrafluoroethylene resin	12	N	...	N	...	N	...	N	...	N	...	...	...
Trifluorochloroethylene polymer	3	N	N	N	N	N	N	N	N	N	N	N	N
Carbon filled phenolic resin	3	0.20	−1.5	0.90	F	0.4	−0.76	F	F	1.6	3.2	0.56	0.59
Asbestos filled furane resin	3	0.90	1.19	−4.03	F	1.3	1.26	1.91	1.41	1.09	0.97	1.26	1.34
Rigid polyvinyl chloride	12	0.32	....	+0.31	....	0.2	....	0.34	....	0.46	....	....	....
	2	....	N	....	0.76	....	0.66	....	0.40	....	4.7	....	....
Cellulose acetate butyrate	6	0.55	F	F	F	0.26	F	2.8	F	F	F	1.2	F
Polyester-glass fiber	3	2.3	F	−6.5	F	−7.6	F	2.1	F	1.0	−6.7	0.8	−6.4
Buna-N Buna-S copolymer	12	1.09	....	1.50	....	1.48	....	0.37	....	2.5	....	....	....
Styrene copolymer	12	+0.16	....	+0.83	....	+0.26	....	+0.47	....	1.48	....	....	....
	2	....	N	....	+0.21	....	N	....	N	....	+0.67	....	....
6-B Nylon	12	F	....	F	....	F	....	4.8	....	1.6	....	....	....
Acrylic resin	12	0.59	....	1.04	....	0.8	....	0.99	....	1.24	....	....	....
Saran	12	N	....	N	....	N	....	−0.6	....	2.2	....	....	....
Neoprene	3	N	36.1	5.3	F	N	46.4	−5.8	35.0	10.3	F	0.21	8.15
Polyethylene	12	N	....	+0.25	....	0.16	....	N	....	N	....	....	....

F = Failed; N = Negligible; ... = No data taken.

Plastics Used in Plant Construction

Plastic	Tradename	Manufacturer
Acrylic resin	Lucite	Du Pont
	Plexiglas	Rohm & Haas
Buna N-Buna S	Uscolite, Kralastic	U. S. Rubber
Cellulose acetate butyrate	Tenite II	Tennessee Eastman
Chlorosulfonated polyethylene	Hypalon	Du Pont
Epoxides	Araldite	Ciba
Furane	Haveg 60	Haveg. Corp.
	Permanite	M. A. Knight
	Lecite	Electro Chemical Engineering
Hard rubber	Ace	American Hard Rubber
Nylon	Nylon	Du Pont
Phenolic	Bakelite	Bakelite
	Durite	Borden
	Dures	Dures
	Textolite	General Electric
	Resinox	Monsanto
	Indur	Reilly Tar & Chemical
Polychloroprene	Neoprene	Du Pont
Polychlorotrifluoroethylene	Kel-F	M. W. Kellogg
Polyester-glass fiber	Laminac	American Cyanamid
	Bakelite	Bakelite
	G-E Polyester	General Electric
	Marcolite	Marco
	MR Resins	Marco
	Vibrin	Naugatuck Chemical
	Selectron	Pittsburgh Plate Glass
	Plaskon	Plaskon
	Paraplex	Rohm & Haas
Polyester film	Mylar	Du Pont
Polyvinyl chloride	Vinylite	Bakelite
	Exon	Firestone
	Geon	B. F. Goodrich
	Pliovic	Goodyear
	Opalon	Monsanto
	Marvinol	Naugatuck
Polystyrene	Bakelite	Bakelite
	Catalin	Catalin
	Styron	Dow
	Koppers	Koppers
	Lustrex	Monsanto
	Cerex	Monsanto
Polyethylene	Alathon	Du Pont
	Bakelite	Bakelite
Polyvinylidene chloride	Saran	Dow
Silicone	Silicone	Dow Corning
	Silicone	General Electric
	Silicone	Westinghouse
Tetrafluoroethylene resin	Teflon	Du Pont



Flexural fatigue

ELONGATION

In the table, plastics are compared in elongation expressed as percent of original length. Elongation is the capacity to take deformation before failure in tension. Of course, plasticized polyvinyl chloride and the elastomers show outstanding elongation, but note that polyethylene is also capable of considerable deformation (over 200 percent) before failure. Some resins fail in tension with almost no elongation.

IMPACT STRENGTH

The way in which certain plastics respond to impact or shock loads is measured by the Izod method (ASTM D256). Because of its reinforcement, polyester-glass fiber is really outstanding. Tetrafluoroethylene resin, trifluorochloroethylene polymer and cellulose acetate-butyrate are good—but polystyrene, saran and certain filled thermosetting plastics show much lower impact strength.

STIFFNESS

Stiffness is resistance to deformation caused by any stress. It is useful as a measure of the strength of plastic especially if determined at increasing temperatures. Since stiffness decreases rapidly with increase in temperature, it can be used to indicate maximum service temperature.

The filled thermosetting resins have the highest stiffness. Rigid polyvinyl chloride, acrylic resin, polystyrene and nylon are intermediate. Polyethylene and, of course, the elastomers are on the low side.

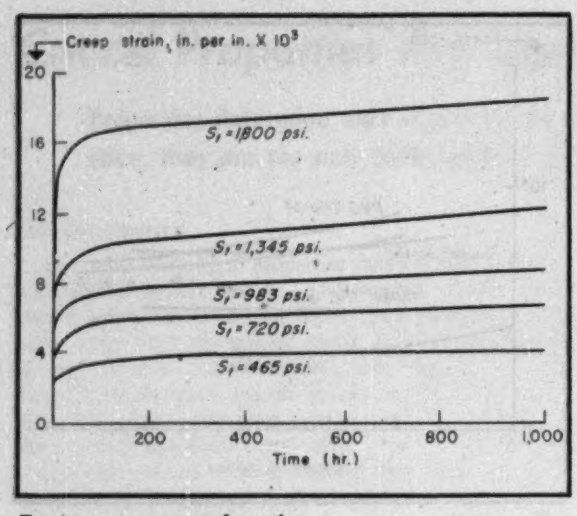
WATER ABSORPTION

Percent water absorption by immersion at 23 deg. C. during 24-hr. is measured by ASTM D570. Equilibrium moisture contents are higher for some plastics. Moisture content affects many other properties such as electrical properties, mechanical strength, moldability, and dimensional stability. Both nylon and cellulose acetate-butyrate are high at about 1.5 percent. The others are all much lower, with polyethylene, tetrafluoroethylene resin, and trifluorochloroethylene polymer at the bottom of the group.

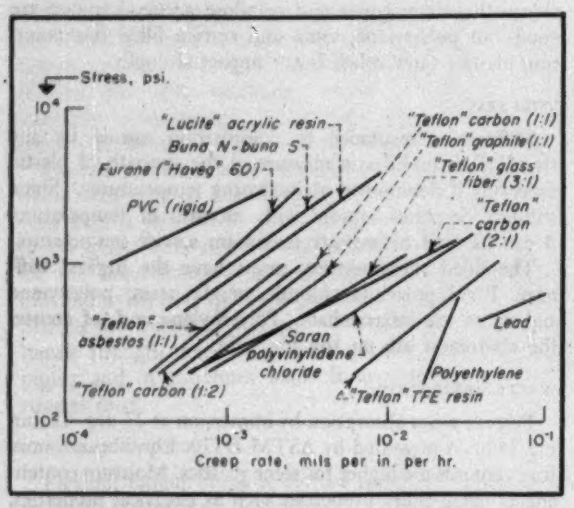
Effect of Solvents on Plastics, % Weight Gain, °C.

Exposure, Months	Carbon Tetrachloride		Toluene		95% Ethyl Alcohol		Acetone		Ethyl Acetate		Cetane	Plastic
	25°	50°	25°	50°	25°	50°	25°	50°	25°	50°	25°	
1	0.19	0.55	N	0.22	N	N	0.11	0.23	0.18	0.55	N	Tetrafluoroethylene resin
3	0.19	2.6	0.20	1.91	N	N	0.10	0.43	0.70	4.5	.....	Trifluorochloroethylene polymer
3	−1.4	−3.7	−1.3	−5.1	0.56	F	F	F	−1.13	F	.....	Carbon filled phenolic resin
3	N	.....	−0.30	.....	1.2	.....	9.1	.....	2.1	.....	.....	Asbestos filled furane resin
2	N	F	F	F	N	N	F	F	F	F	N	Rigid polyvinyl chloride
3	F	F	F	F	F	F	F	F	F	F	.....	Cellulose acetate butyrate
3	15.3	24.7	12.7	11.6	6.5	2.6	13.1	13.4	15.1	F	.....	Polyester-glass fiber
12	F	F	F	F	70.6	.....	F	F	F	F	0.19	Buna-N Buna-S copolymer
12	F	F	F	F	1.8	.....	F	F	F	F	.....	Styrene copolymer
12	0.64	.....	0.41	.....	F	.....	.....	.....	.....	.....	N	6-B Nylon
12	F	F	F	F	F	F	F	F	F	F	2.1	Acrylic resin
12	.....	.....	5.4	.....	N	.....	3.0	.....	6.2	.....	N	Saran
2 wks.	1.4	5.3	.....	6.8	.....	N	.....	3.9	.....	5.7	.....	
3	F	.....	F	.....	4.4	.....	11.7	.....	F	.....	.....	Neoprene
12	F	F	F	F	.....	.....	1.6	.....	3.8	.....	11.4	
2	F	F	F	F	0.26	0.13	.....	2.2	.....	4.8	.....	

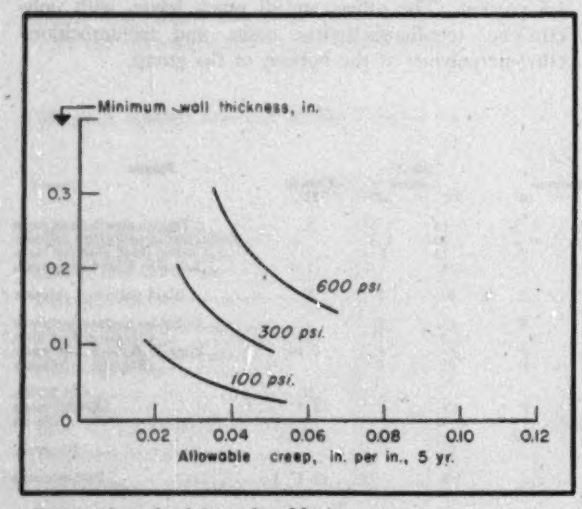
F = Failed; N = Negligible; ... = No data taken.



Tension creep curves for nylon.



Creep rate vs. stress.



Design chart for 1-in. nylon 66 pipe.

MAXIMUM SERVICE TEMPERATURE

Maximum service temperatures are recommended by the suppliers of plastics. It is the temperature that should not be exceeded during long exposure. Tetrafluoroethylene resin has the highest service temperature. On the low side in the 55 to 80 deg. C. range are hard rubber, polyvinyl chloride, polyethylene, and cellulose acetate butyrate. Obviously, the utility of plastics will be greatly extended when the upper temperature limit is raised.

CREEP

Creep occurs more rapidly in most plastics than in metals, and so it is one of the critical design factors. The plot shows the strain developed with time as nylon is subjected to tension at various stress values. The first part of the curve is the elastic effect, next is the time dependent part. There is a third stage not shown where the curves turn up rapidly to a point of failure.

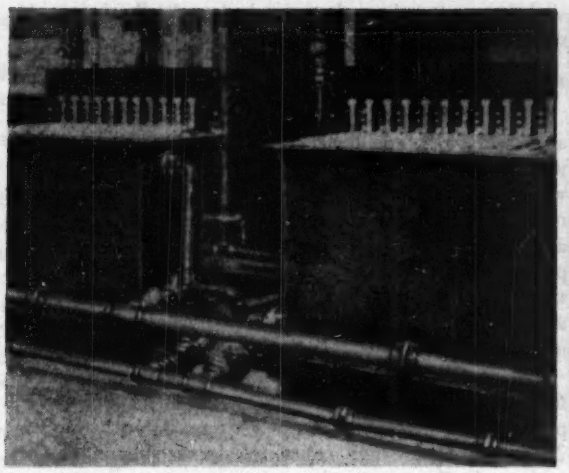
Another plot shows how a group of plastics compare in rate of creep at 100 hr. The rigid materials—such as polyvinyl chloride, furane resins, buna N-buna S copolymer, and acrylic resin—are more resistant to creep. Much can be done to control rate of creep. For example, the figure shows that the use of filler makes tetrafluoroethylene resin more resistant to deformation. Lead creeps more rapidly than any of the plastics at the stress levels shown. However, steel would be far off the figure on the left.

Creep is exceedingly complex in plastics, and we in the Polychemicals Department of the Du Pont Co. are trying to convert the sort of experimental data just shown into diagrams of permissible creep at different loads. With this chart an engineer can start with a given allowable creep rate, for example 5 percent in 5 yr., and then at a given internal pipe pressure (such as 600 psi.) he can pick out the *minimum* wall thickness, in this case about 0.2 in. The chart for nylon pipe is an example of the design charts being developed for other important plastics.

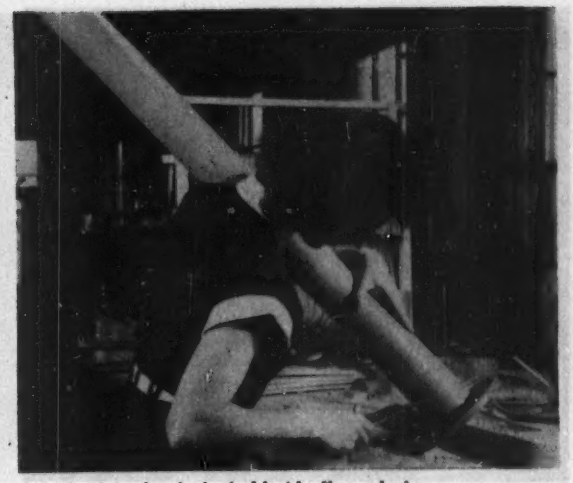
CHEMICAL RESISTANCE

Chemical resistance of plastics is one of their big advantages over metals. The test method used is ASTM D543 with modifications to extend exposure time and to test at higher temperatures. Plastics are classified as to their resistance to solvents in the table below. It is evident that most of the plastics are not outstanding in their resistance to solvents. Of course, it is difficult to generalize because resistance depends on the solvent, the concentrations, and the temperatures. However, some of these are rated good, such as certain furane plastics, nylon, polyesters, and saran except that they do not withstand hot benzene and other very active solvents. The only one rated excellent is tetrafluoroethylene resin. In a 24 hr. comparison test, trifluorochloroethylene polymer absorbed about 5 percent of its weight of hot benzene whereas tetrafluoroethylene resin absorbed 0.0 percent.

In the table on effects of aqueous systems, a number of plastics are rated excellent. And this is why they withstand many plant streams that are highly ruinous to metals. Naturally a candidate plastic should be exposed to a specific plant stream with all of its impurities before it is selected for service. There are many instances where only parts per million of a component determine the effect on materials containing the stream.



Hard rubber tanks and pipes.



Non-plasticized polyvinyl chloride flanged pipe.

Industrial Experience Aids Selection

While properties are important guides, practical experience is often more helpful. The following examples describe some jobs where plastics are in actual plant service.

HARD RUBBER

Hard rubber has good resistance to a number of acids and to inorganic salt solutions. It is easily machined, molded, extruded, and cemented. It is available in standard sizes of rods and pipes with fittings. However, it has some serious disadvantages including low impact strength and limited resistance to oxidizing agents, and to many solvents. For these reasons there is a trend toward replacement by more durable plastics such as polyvinyl chloride, buna N- buna S copolymer, and saran.

RIGID POLYVINYL CHLORIDE

Unplasticized polyvinyl chlorides have rather good resistance to chlorine, and to certain oxidizing agents such as sodium hypochlorite. They have outstanding resistance to acids including nitric, sulfuric, hydrochloric, and hydrofluoric. However, they are affected by many solvents, especially hydrocarbons, halogenated compounds, ketones, and the like.

They are quite rigid and can be welded by the use of a hot-air torch into fume ducts, tank linings, and all sorts of shapes. They are now rather widely used for plumbing, irrigation, and oil well lines. Many plants are now using polyvinyl chloride in valves and piping for chlorine, sodium hypochlorite, and hydrochloric acid. Viscose rayon plants use a great deal of dilute sulfuric acid containing sodium salfate. These streams are rather well handled by polyvinyl chloride in the form of spinning machine parts, sheeting, duct work, pipes and valves.

BUNA N-BUNA S COPOLYMER

Rigid buna N-buna S copolymer resembles hard rubber in its chemical resistance but has somewhat greater resistance to dilute nitric and other oxidizing acids. It is also much tougher and shows good moisture and abrasion resistance.

Perhaps its greatest weakness is its low resistance to many organic solvents. It also has rather limited outdoor durability.

Buna N-buna S copolymer has been used for inserts in filter press head plates and to replace hard rubber for hydrochloric acid service. Pipes and sheet stock can be bent quite easily by heating in a water bath or hot air oven to about 85 deg. C. Sheets can be bent into curved objects such as troughs, channels or ducts, and pipes can be curved to any desired radius. The copolymer can be bonded easily to itself with solvent based adhesives. The copolymer is an ideal replacement for alloys for small metal parts, for pipes, valves and sheeting in corrosive services where solvents are absent (e.g., in viscose rayon plants).

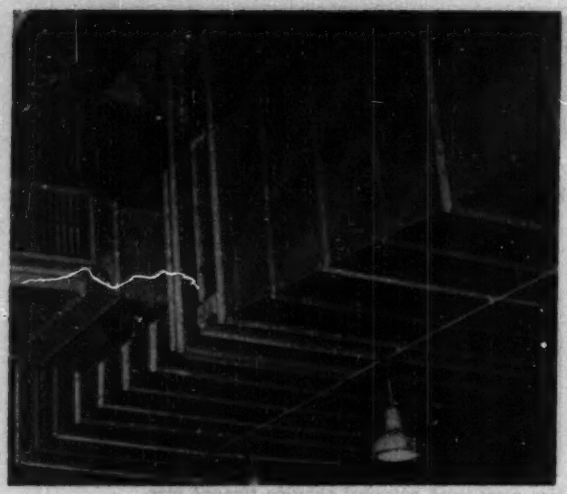
SARAN POLYVINYLIDENE CHLORIDE

Saran is a rigid, somewhat brittle polymer.

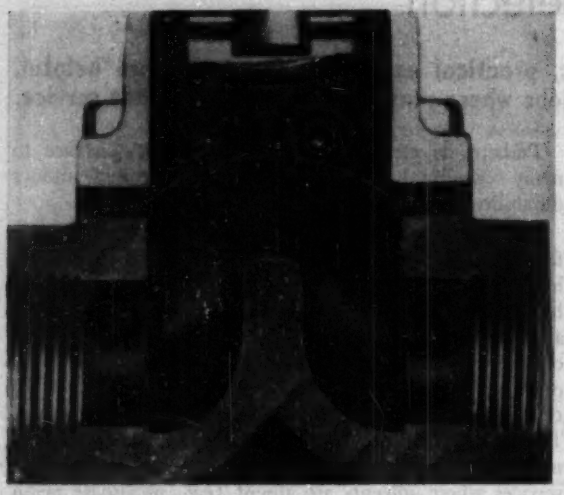
It shows low permeability to most corrosive acids and certain solvents. However, it is not resistant to strong alkalis nor to aromatic and chlorinated hydrocarbons.

It is used mainly in lined steel pipes for supply and disposal lines for acids and dilute bases. Saran lined steel has been used to replace rubber lined steel in pipe lines and storage tanks for handling hydrochloric acid containing fluorides. Saran is also being used as acid resistant entrainment screens in evaporators. These screens replace a nickel-chromium-molybdenum alloy and allow the evaporators to operate at 100 percent overload. Advantages of saran window screening are well known.

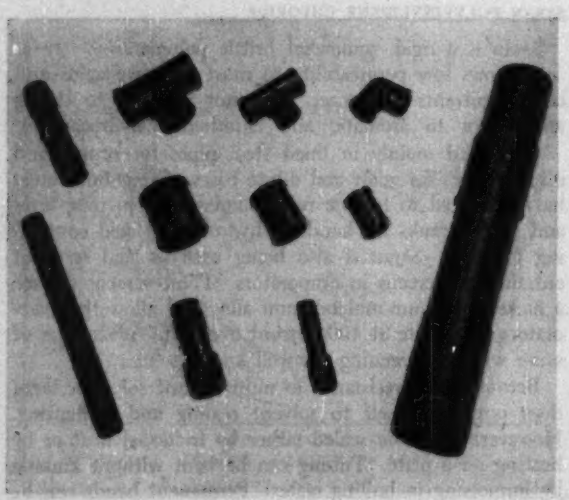
Because of its resistance to most organic solvents, saran does not lend itself to solvent sealing and cementing. However, it can be sealed either by frictional heat or by heating on a plate. Tubing can be bent without kinking by immersing in boiling water. Permanent bends can be made in this manner by curving the tube at an angle



Buna N- Buna S copolymer duct work.



Saran diaphragm valve.



Polystyrene pipe fittings.

slightly greater than that required and allowing it to spring back somewhat on cooling.

POLYSTYRENE

Polystyrene shows good resistance to dilute aqueous acids and bases, and hence it is used for water lines and jet well lines. Frequently, fittings of polystyrene are used with polyethylene pipe. Polystyrene is rather brittle and readily attacked by most organic solvents. Major plant applications are not known at this date. But in some polystyrene formulations, impact strength has been stepped up to 5 ft. lb./in. of notch, and heat resistance increased to about 100 deg. C.[8] These indicate that we can expect more industrial applications.

Polystyrene is a familiar material in the housewares field. Refrigerator panels, trays, door liners, and other parts take 26 percent of the polystyrene output. Another 20 percent goes into radio, television, storage battery cases, and other electrical components.

CELLULOSE ACETATE-BUTYRATE

In the production of oil there are 4 major sources of corrosion: salt water, sour crude oil, corrosive earth, and electrolytic action. Cellulose acetate-butyrate has been used successfully where all of these sources exist.

Typical uses include disposal well lines, vent lines, slurry lines, natural gas lines and even city water lines. However, this resin is likely to be degraded in the presence of certain solvents and strong alkalis.

Pipe is joined by bell and spigot joints or threaded fittings of either resin or steel. These can be cemented to the pipe. Pipe can also be joined by Van Stone flanges.

Continuous supports by means of rigid channels, tubes, or V-shaped troughs are desirable for the less rigid pipes in a horizontal position, but supports every five feet may be used for the more rigid pipes.

ACRYLIC RESIN

The acrylic resin plating barrel shown takes advantage of the resistance of this resin to corrosive plating solutions and its low electrical conductivity. It can handle inorganic acids up to about 50 percent concentration at room temperature.

The shatter resistance, outdoor durability, light weight and rigidity of acrylic resin will undoubtedly contribute to greater replacement of plate glass in the future. Other industrial applications include hood doors, wall panels, sky-lights, light fixtures, and signs. Special shapes can be molded or built-up from sheets.

PHENOLIC RESINS

Phenolic resin rolls are commonly found in many chemical plants (rayon plants, for example). Phenolic resins are available as products filled with either asbestos or coke flour.

Phenolics are used for handling nonoxidizing acidic solutions including medium concentrations of sulfuric acid, dilute nitric acid, hydrochloric acid, wet chlorine, and solutions of ferric and cupric chlorides. Certain phenolic resins, especially coke flour-filled compositions, have good resistance to many solvents.

Phenolics are making revolutionary changes in the foundry field where resin-sand shell molds are being

developed intensively by Monsanto and Bakelite. This is a process application, but as engineers we should be aware of it, because it is a source of better castings with lower finishing costs.

FURANE RESINS

Furane resins have contributed much toward control of corrosion. They are black thermo-setting resins of somewhat uncertain composition made by polymerizing furfuryl alcohol in the presence of an acid catalyst. They have good resistance to most acids except oxidizing acids like nitric. They also show resistance to alkalis and to many solvents. They have good rigidity and fair temperature resistance. One of their major weaknesses is their tendency to continue to cure and crack in service.

Furane resin cement is commonly used in the constructions of large pickling tanks. These resins can also serve as linings on the inside of the walls and lids of steel vessels. Trowelling over steel mesh welded to the vessel assures good adhesion.

Probably the most useful furane resin is the asbestos filled product. It is widely used for pipes, valves, tanks, towers, and almost every conceivable type of chemical structure.

POLYESTER-GLASS FIBER

Tanks of polyester-glass fiber of 1,000 gal. capacity are used for transporting fuel and water across the Arabian Desert. It is claimed that they will last 10 to 50 times as long as steel tanks. The desert is said to be very hard on steel as one sandstorm rips off the paint, dampness at night produces rust, and the next sandstorm rips off the rust. The plastic tanks are unaffected under the same circumstances. Since the plastic is stronger than steel, weight for weight, pay load gains of as much as 50 percent have been realized. Price of the tanks is higher than that of mild steel tanks but lower than that of lined or stainless tanks.

Another polyester-glass fiber tank is now handling aluminum sulfate liquor at the Mobile, Alabama plant of the American Cyanamid Co.[4] The tank handles 4,000 gal. of liquor at temperatures up to 115 deg. C. It stands 8 ft. high and 14½ ft. in diameter and is equipped with a stack 22 ft. high and 30 in. in diameter. Sidewall thickness is ⅜ in. and bottom thickness ½ in.

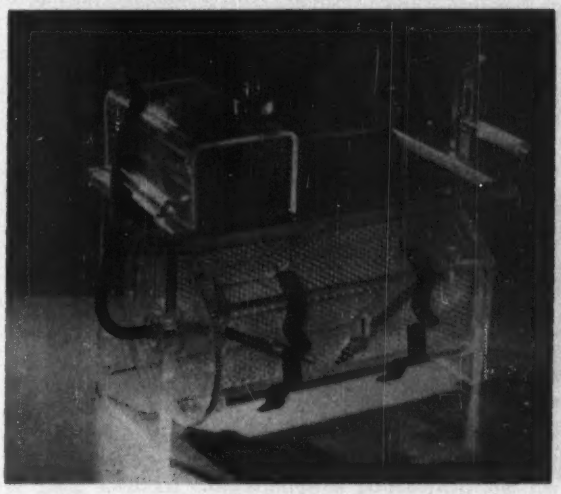
As described above the polyester-glass fiber resins have excellent strength properties. They are also quite resistant to a wide range of corrosive materials, but not to strong alkalis, nor aromatic or halogenated hydrocarbons.

These resins are being used in ever greater quantities for many products—hot or cold water lines under pressure, salt water lines on ships, oil well piping, plating tanks, bath tubs, washing machines, aircraft, boats and transparent sheeting. The Navy has contracted for a number of compressed gas cylinders. The cylinders are to be standard size of 50 lb. capacity, must be nonmagnetic, and must withstand 2,000 psi.[5]

Polyester glass fiber pipes can be joined or repaired by mixing polyester resin and catalyst and wrapping precut lengths of glass fiber around and into the joint or patch area. Additional resin should be applied to attain a neat appearance.

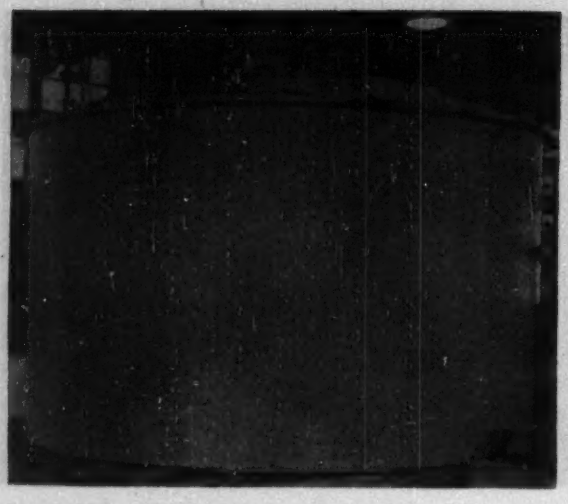
According to the Society of the Plastics Industry[6] about

Cellulose acetate-butyrate pipe.

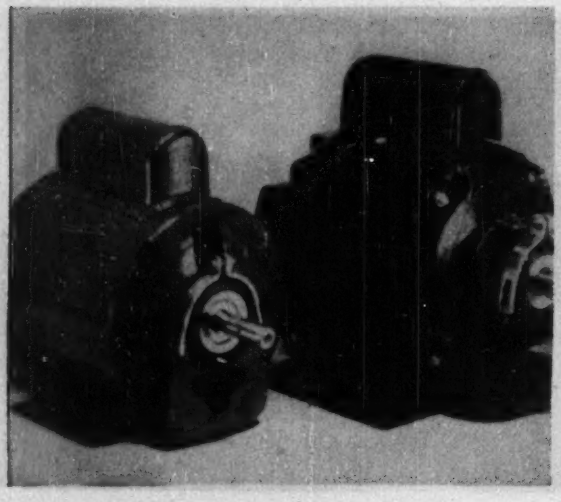


Acrylic resin plating barrel.

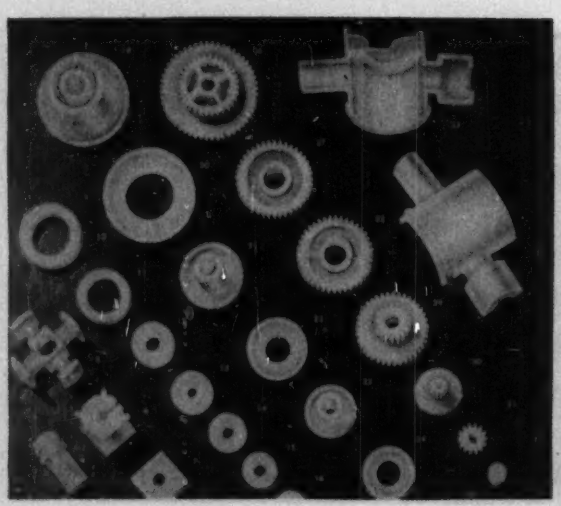
Furane resin cement.



Polyester-glass fiber tank.



Polyester film-insulated motor (left).



Nylon gears, bearings, etc.

19 million lb. of polyester resins were sold for use in reinforced plastics last year, with fibrous glass reinforcing agents amounting to about 11 million lb. A 40 percent increase is forecast for 1953. Some 120 manufacturers are now active in this field.

POLYETHYLENE TEREPHTHALATE FILM

Shown are two ¾-hp. G.E. motors. The polyester film insulated motor on the left is 40 percent smaller. Polyethylene terephthalate film is one of the newer developments of du Pont research. It is now in the sales development stage and has shown promise in many fields, particularly the industrial field. Construction of a $10 million plant has been started, and this plant should be in production by late 1954. The film is now being produced on semiworks facilities in roll form ranging in film thickness from ¼ mil up to and including 7½ mils. Quantities available are being used in pilot production programs.

This polyester film has a combination of physical, electrical, and chemical properties which make it suitable for many electrical and industrial uses. One of the outstanding characteristics is its high mechanical strength and good dielectric strength over a wide temperature and humidity range. Its tensile strength at 25 deg. C. is in the order to 25,000 psi. Another outstanding mechanical property is high impact strength. The value of 75 kg. cm. (falling ball test) for a 1 mil thick section is at least twice that of any known commercial film of comparable thickness. The moisture absorption at 25 deg. C. is about 0.3 percent. This provides dimensional stability under conditions of varying relative humidity. A change of only 0.07 percent occurs over the range of 20-92 percent relative humidity. The film shows excellent electrical properties which remain relatively constant over a wide range of temperatures (−50 to 150 deg. C.) and humidities (20 to 92 percent R.H.). The high dielectric constant, high dielectric strength, and low power factor make the film of interest as a condenser dielectric, and for cable and wire insulation. Motor insulation is a particularly good application due to the high mechanical and dielectric strength of the film.

Polyethylene terephthalate film resists attack by many chemicals, oils, and solvents. There is little loss in mechanical and electrical properties on contact with such impregnants as mineral oils and silicones. Solvents such as ethyl acetate, methyl ethyl ketone, xylene, naphtha, toluene, methyl "Cellosolve", methanol, and glacial acetic acid have little effect on the film. It also shows good resistance to most of the common electrical varnishes and impregnants.

While the electrical field will be one of the largest single markets for the new film, such applications as magnetic sound recording tapes, electrical tapes, pressure sensitive tapes, printed covering for acoustical tile, metallic yarn for drapes and clothing, light weight storm windows, agricultural glazing, and many others are being developed.

NYLON

A number of gears, bearings, and other small parts made of nylon are shown. The high temperature resistance, toughness, light weight, self-lubrication, and ease of molding make nylon excellent replacements for metals in these uses. These are not machined but injection molded parts.

Many nylon parts are used in automobiles. Examples include dome light lenses, fuse holders, and striker blocks.

A nylon speedometer gear introduced in 1951 saved 50 percent in overall production costs of the part besides giving better performance. The Hudson uses a nylon washer in the floor board to seal the clutch pedal arm and to bear the friction as the pedal is depressed. The Packard has an antenna which is raised and lowered by a motor driven device, and nylon is used as a flexible thrust rod. There are many similar uses for nylon moldings in fare meters, cash registers, business machines, textile machinery, and builders' hardware.

POLYETHYLENE

Polyethylene has exceptional resistance to acids and alkalis and certain solvents except aromatic hydrocarbons, chlorinated compounds, certain ethers, esters and ketones. It is also attractive because of its low cost and ease of fabrication.

Polyethylene pipe weighs only about 1/9 as much as steel.

Polyethylene pipe lines are used to transfer hydrochloric acid from tank cars to glass carboys. In one such installation polyethylene has replaced rubber lined steel pipe. Pin holes developed in the rubber lined pipe, and the metal disintegrated quickly.

An 800-ft. line of 3-in. polyethylene pipe transfers tomato pulp at the Morgan Packing Co., Austin, Ind. Polyethylene is said to show a lower mold count after being flushed with warm water than galvanized pipe after steam cleaning.

Polyethylene sheets can be welded into all sorts of shapes, including tank linings and top sections.

Shown is a lining placed inside a steel vessel. To control permeability by corrosive liquids the liner wall thickness should be at least ¼ in.

Heat-fusing polyethylene using a gas torch is a technique very similar to that used for conventional metal welding. The heat for fusion is supplied by a hot gas gun which uses heated nitrogen to fuse the polyethylene filler rod to the pipe. Oxygen in the heated gas should be avoided because oxidation of the polyethylene causes poor joints. This method gives polyethylene to polyethylene contact and a skilled operator can produce fused seams of consistently good strength.

TRIFLUOROCHLOROETHYLENE POLYMER

Trifluorochloroethylene polymer has outstanding resistance to many corrosive liquids and also many solvents. It has rather good high and low temperature properties and shows good electrical properties. It can be molded, heat sealed, and extruded. It is available in transparent sheets and as a nonaqueous dispersion. It finds some use in gaskets, diaphragms, sight windows, electrical moldings, sheets and films.

TETRAFLUOROETHYLENE RESIN

A valve of tetrafluoroethylene resin for handling acidic brine—one of the most corrosive streams plant engineers are called upon to handle—is shown. Casing is of steel but the plug, stem, lining, and pipes are of the resin.

Tetrafluoroethylene resin is really the queen of the resins for corrosive service because it is inert to almost everything. It is attacked only by molten alkali metals and fluorine at elevated temperatures and pressures.

Another outstanding property is its excellent temperature resistance—it shows high impact strength over the range of −68 to 260 deg. C. And molded bars show only 1 percent loss in tensile strength at 249 deg. C. after one month.

A third outstanding property is its low power factor even at high frequencies, high dielectric strength, and good arc resistance. Low water resistance assures retention of its electrical properties even after long exposure to moisture.

Tetrafluoroethylene resin has peculiar antistick properties—it does not want to stick to anything, not even itself. Tire molds are coated tetrafluoroethylene finishes (1½ mil primer, 1 mil coat).

Tetrafluoroethylene resin is in service as gaskets, pump seals, valve seats, diaphragms, pump pistons and impellers, pipe, lining, and electrical insulation for high voltage cable. Molding, extruding and other methods of fabricating this resin are being developed rapidly.

CHLOROSULFONATED POLYETHYLENE

Industrial hose is one application of chlorosulfonated polyethylene, a new elastomer recently announced by the Polychemicals Department of the du Pont Co. The product is so new that there is little industrial experience with it as yet, but it is included because of its unique properties. Like all elastomers it must be compounded to attain the best possible properties in specific uses.

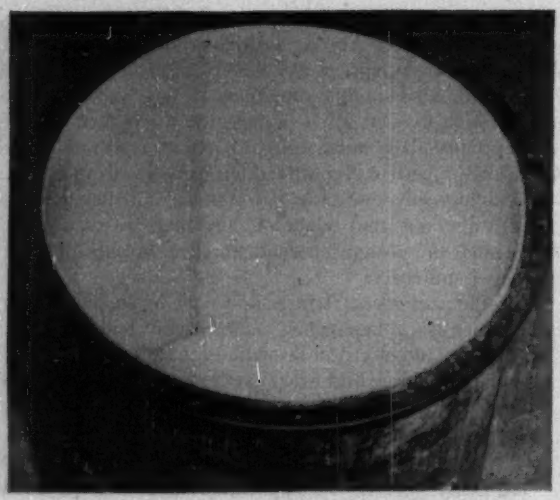
In resistance to concentrated acids, chlorosulfonated polyethylene is superior to elastomers including natural rubber, GR-I, GR-A and to neoprene.

In laboratory tests a litharge cured chlorosulfonated polyethylene stock withstood attack by nitric acid up to 70 percent and sulfuric acid up to 95 percent at about 21 deg. C. With fuming and anhydrous nitric acid or at higher temperatures a magnesia curing system is required. Chlorosulfonated polyethylene also resisted other concentrated acids including 100 percent chromic acid, 85 percent phosphoric acid, 37 percent hydrochloric acid, and glacial acetic acid—where other elastomers disintegrated or were severely attacked.

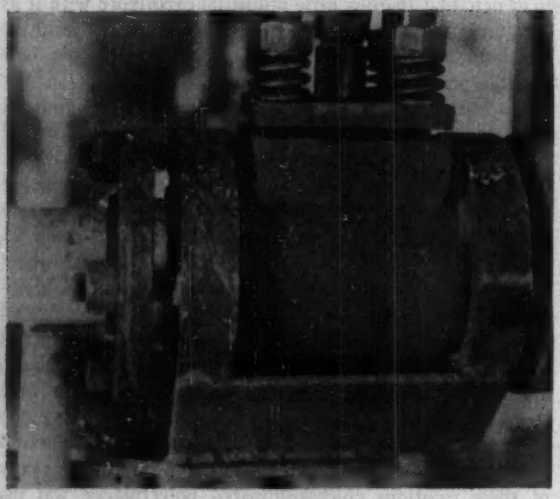
As expected, this remarkable resistance was also found in dilute acids with litharge cured compositions. In many of these solutions chlorosulfonated polyethylene was exposed for seven days at 70 deg. C. without appreciable effect. Chlorosulfonated polyethylene is also very inert to liquid chlorine, and such oxidizing solutions as chlorine dioxide bleaching solution, sodium hypochlorite and sodium dichromate.

Resistance of chlorosulfonated polyethylene to basic solutions, such as concentrated potassium hydroxide or 20 percent sodium hydroxide, is also excellent. In a series of tests in which chlorosulfonated polyethylene was exposed to vegetable and mineral oils as well as aliphatic and aromatic solvents, it was found to be approximately equivalent to neoprene. In aromatic and chlorinated hydrocarbons it swells considerably. Unlike most other elastomers, compositions of chlorosulfonated polyethylene have outstanding resistance to ozone, oxygen and other oxidizing agents. They do not require carbon black for reinforcement or weather resistance, hence white and many colors are possible.

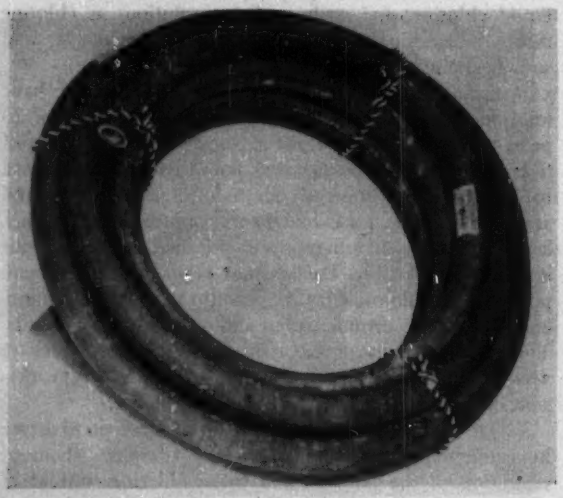
The resistance of chlorosulfonated polyethylene to attack by ozone may be attributed to the complete chemical saturation of the polymer and to its chlorine content of approximately 28 percent. Chlorosulfonated polyethylene



Polyethylene tank lining.



Tetrafluoroethylene resin valve.



Chlorosulfonated polyethylene acid hose.

can be used as an additive to a number of other elastomers to impart ozone resistance.

Experience shows that chlorosulfonated polyethylene can be used indefinitely up to 100 deg. C. At temperatures up to 125 deg. C., stabilized compositions may remain serviceable for two to three months of continuous exposure.

In general, the heat stability of chlorosulfonated polyethylene is superior to that of most elastomers and many rigid and semirigid organic polymers, excepting tetrafluoroethylene resin, trifluorochloroethylene polymer, polyester-glass fiber, silicone rubbers and the various polyacrylic rubbers.

The flex durability of chlorosulfonated polyethylene is also many times better than that of most other elastomers. A number of chlorosulfonated polyethylene resin stocks containing 70-80 volume percent of elastomer required more than several million flexcycles per inch of crack growth and in some stocks crack growth was completely absent. This outstanding performance can be explained by the small amount of cold flow which occurs when this elastomer is severely stressed. Without this compensation for such stresses, other elastomers fail rapidly under similar conditions.

Chlorosulfonated polyethylene also has excellent abrasion resistance and in tests conducted on the du Pont abrader, it appeared among the best, although certain GR-S, GR-A and neoprene compositions also perform well. It can be molded, foamed, extruded, and dissolved in certain solvents. Because of these and other desirable properties many other uses are expected to develop as a material for plant structures, such as gaskets, linings for vessels and pipe, protective coatings, diaphragms, moldings, flexible and semirigid sheeting.

NEOPRENE

Neoprene is the generic term for a number of chloroprene polymers developed for specific applications. The chemical linkage of chloroprene gives the elastomer light, heat, and air resistance as well as good resistance to oil and chemicals. It has good all around resistance to most acids and bases as well as oxidizing agents including glacial acetic acid, 40 percent hydrofluoric acid, 30 percent hydrogen peroxide, 10 percent hydrogen chloride, 95 percent potassium hydroxide and 40 percent sodium hydroxide. It has good resistance to aliphatic hydrocarbons, but aromatic and chlorinated hydrocarbons will swell neoprene; and experience indicates that neoprene tank linings are penetrated even by small amounts of benzene attacking the adhesive.

The addition of carbon black to neoprene greatly improves its physical properties. Its resistance to abrasion is equal or superior to that of GR-S and GR-A rubbers. It does not support spontaneous combustion and even though its electrical properties are not as good as those of natural rubber it is used as outer sheath of cable covers and as insulation material where oil and weather resistance are required. For continuous service neoprene compounds can be used at 80 to 95 deg. C., but they will remain serviceable for one to two months at 125 deg. C. and higher when used intermittently.

Neoprene also finds many industrial applications in various chemical industries. It has been tested and found satisfactory as lining for valves, pumps, condenser heads.

It is used successfully as seals for dry-gas holders, as packing material, heavy duty flood mat, industrial roller covering. It is made into oil resistant hose and tubing, gaskets, fuel cells and many other useful industrial objects. Sheet goods in thickness up to 1/16-in. are readily bonded to metals and serve as lining of chemical storage tanks, vessels, pipes, ducts and fittings.

GR-A (BUNA-N)

GR-A is probably best known for its good resistance to hydrocarbons including oil, gasoline and aromatic solvents.[8] It resists many acids, including 30 percent sulfuric, but is generally not recommended in the presence of strong oxidizing agents, and active solvents such as chlorinated or nitrated hydrocarbons, ketones, acetates, benzene and 99 percent glacial acetic acid.

In its heat resistance it almost equals neoprene and has been used intermittently up to 150 deg. C. without serious effect. However, actual service tests should be used to determine utility at elevated temperatures. Like GR-S, carbon black is required to bring out optimum properties. GR-A can be blended with rubber, GR-S and phenolic resins. When the latter are used compounds with high tensile strength, good abrasion and flex resistance result. Like GR-S, its ozone resistance is limited.

GR-A is molded into many useful objects including bellows, fuel cells, pump valves, and inserts. It is made into wire and cable jackets where resistance to aging and flex life are important. As it is readily bonded with solvent solutions to both metal and wood it is suited for tank, duct and pipe linings. Through its oil resistance it also finds widespread application as oil and gasoline hose and in the printing, paper and textile industries.

GR-S

GR-S is a general purpose synthetic rubber which was used to replace natural rubber in tires and many other applications during the war. Compared to neoprene, GR-S has poor resistance to hydrocarbons, including oil and gasoline. It has generally good acid resistance, but natural rubber is preferable in contact with hydrochloric, hydrofluoric and nitric acids, as well as potassium and sodium hydroxide and oxidizing solutions. It has slightly better resistance to atmospheric deterioration than natural rubber.

To obtain good physical properties in GR-S, it is necessary to compound it with channel black or fine furnace black which limits color effects. GR-S has good abrasion resistance and low water absorption. Like natural rubber, but unlike chlorosulfonated polyethylene, it will stress crack when exposed directly to sunlight. Many GR-S compounds have been developed for use in the automotive and chemical industries. It is available as linings for ducts, pipes and tanks. It is also used for abrasion resistant coatings.

NATURAL RUBBER

Natural rubber has a better balance of properties than GR-A and GR-S as a lining material for most service requirements. Neoprene has better resistance to hydrofluoric acid and aliphatic oils. Chlorosulfonated polyethylene should have an advantage over these linings when freely available.

Although hard rubber has excellent chemical resistance, other factors such as physical abuse and thermal changes require the use of softer compounds.

Natural rubber is widely used for hydrochloric acid in all concentrations. It resists attack by phosphoric acid, formic and acetic acid, as well as sodium and potassium hydroxide. It is not recommended for use in such active solvents as carbon tetrachloride, ketones, ethers and hydrocarbons. Exposure to the lower alcohols including butyl and isopropyl has relatively little effect on natural rubber.

Its abrasion resistance is about equal to that of GR-S and GR-A. Although not equivalent to chlorosulfonated polyethylene in this respect, it has been used for many years for roll-covers in the paper industry, for steel-mill rolls and textile roll coverings.

Generally natural rubber should not be used at temperatures higher than 90 deg. C. However, with little mechanical abuse and intermittent service, it can be heated to 150 deg. C. Generally a synthetic rubber should be used where both oil and higher heat resistance are required.

None of the elastomers appears completely resistant to aging. Natural rubber oxidizes slowly at low and medium temperatures with an accompanying loss of strength and change in stiffness.[8] Although inhibitors can be used to restrict these effects, higher temperatures, particularly under oxidizing conditions, cause either embrittlement or softening to a resinous state.

Potentialities for Plastics Are Good

Overall market picture for both thermoplastic and thermosetting materials is impressive. Needs for plastics to withstand higher temperatures and pressures are likely to be met.

What does the future hold for plastics as materials of construction? First, let's take a look at a market estimate for pipe based on government sources.

Pipe became available in about 1948, and by 1950 the volume reached 5¼ million lb. Probably more would have been installed in 1950 if the supply of plastic had been adequate. *On the basis of current uses only* the market for plastic pipe in 1960 is expected to reach 75 million lb. Polyethylene accounted for about ½ of all plastic pipe made in 1950 and in 1960 it is expected to account for about ¾ of the volume.[9]

Possibly the automobile will give us a clue to the future of plastics. According to Modern Plastics Magazine[10] the amount of plastic used per car in 1941 was 7.5 lb. In 1952 it was 15 lb. and in 1957 it is expected to be 30 lb. making a market of over 250 million lb. in that year.

But the over-all market picture is really impressive. This shows the total U. S. production of all thermoplastics.[11] In 1950 it was about 1 billion lb.—in 1952 it was perhaps 1½ billion lb.

Total U. S. production of thermo-setting resins was about 1 billion lb. in 1952. Thus the total production in 1952 was about 2½ billion lb.

It is interesting to note that about ½ of the growth of

both resins to date occurred in the past 5 years. It has been forecasted that the production of plastics in this country barring emergencies will reach 3.4 billion lb. in 1955, 6.9 billion lb. in 1960, 10.4 billion lb. in 1965, 13.9 billion lb. in 1970, and 17.5 billion lb. in 1975."

What are some of the factors that will stimulate the use of all of these plastics as materials of construction?

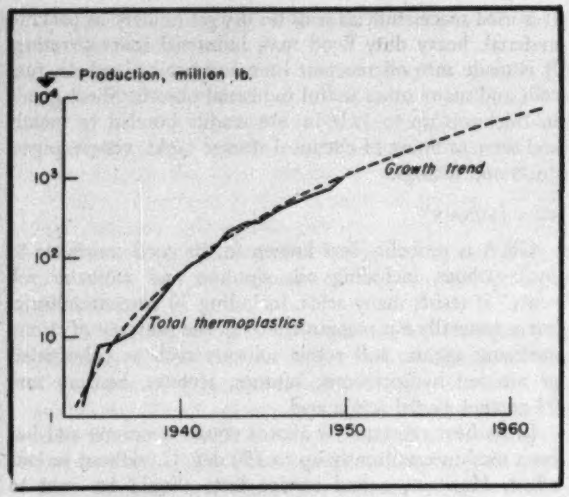
Use of plastics should really spurt when they are included in the standard construction codes for pipe, linings, and other structures. For example, the National Sanitation Foundation at the University of Michigan has been engaged by manufacturers of extruded plastic products to start on work to show whether plastic pipe is attractive for domestic water piping.

As another step in the direction of standardization, we might consider the tests on plastics at M.I.T. sponsored by the Manufacturing Chemists Association. The objectives are the measurement and analysis of the properties of plastics.

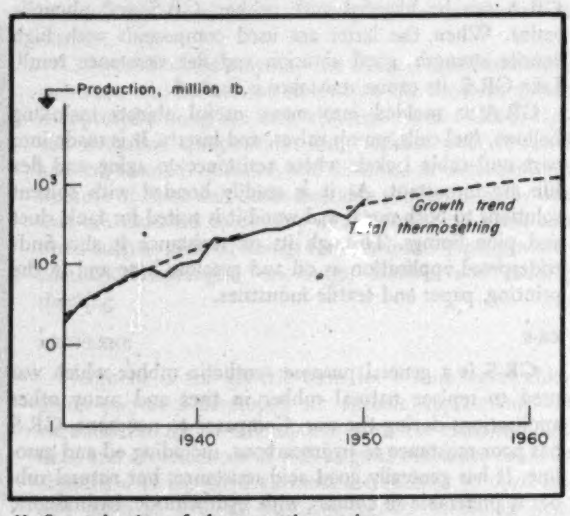
It seems clear that resins will be used more and more where temperature and pressure will permit. Higher operating temperatures and pressure limits are needed and will be met by new thermosetting high impact resins that will be useful above 200 deg. C.

There is more information on how to fabricate pipes, sheets, and special shapes than has been unattainable heretofore. And soon engineers will know more about putting on plastic coatings, heat fusing and other ways of assembling plastics in the field. More and more plants will establish fabricating shops. Eventually the corrosive action of plant streams should be well controlled with such means as tetrafluoroethylene resin linings for vessels of any size and shape, or polyethylene pipe for severe service in underground brine and water lines.

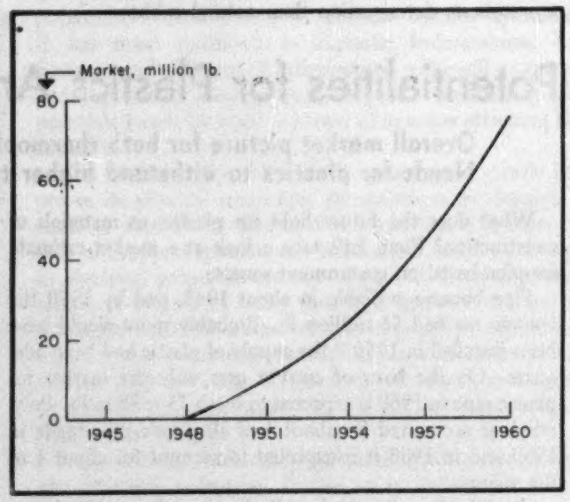
Then, as experience in the chemical industry points the way, other segments of the building, equipment and transportation industries will hear the promise and the challenge of plastics.



U. S. production of thermoplastics.



U. S. production of thermosetting resins.



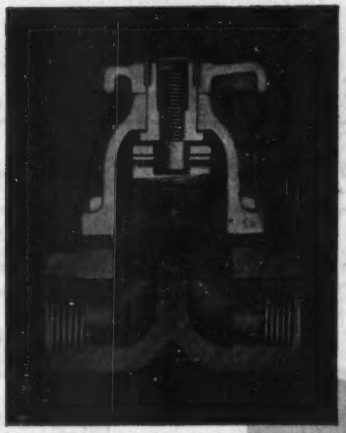
Market for plastic pipe.

PHOTO CREDITS

Hard rubber.....Am. Hard Rubber
Nonplasticized PVC (Boltaron 6200).....H. N. Hartwell & Son
Buna N—Buna S copolymer (U. S. Rubber).....Du Pont
Caran.....Am. Hard Rubber
Polystyrene (Yardley Plastics).....Du Pont
Cellulose acetate butyrate.....Tenn. Eastman
Acrylic resin.....Du Pont
Furane resin.....Electro Chem. Engr. and Mfg.
Polyester film.....Du Pont
Molded nylon.....Du Pont
Polyethylene.....Du Pont
Tetrafluoroethylene resin (Du Pont).....Du Pont
Chlorosulfonated polyethylene (Du Pont).....Du Pont
Polyester-glass fiber tank.....Am. Cyanamid

REFERENCES

1. Uhlig, H. H., *Chem. Eng. News*, 27, 2764 (1949).
2. "Resources for Freedom," Vol. 4, p. 7, U. S. Government Printing Office, Washington 25, D. C. (1952).
3. Seymour, R. B. and Steiner, R. H., *Chem. Eng.*, Jan. 1953, p. 255.
4. *Plastics World*, Mar. 1953, p. 1.
5. *Modern Plastics*, Nov. 1952, p. 194.
6. *Plastics News Letter*, 13, No. 4 (Jan. 1953).
7. The Vanderbilt Rubber Handbook, edited by Rogers, S. S., R. T. Vanderbilt Co., 1948.
8. Burton, W. E., "Engineering with Rubber," McGraw-Hill Book Co., 1949.
9. "Resources for Freedom," Vol. 4, p. 148, U. S. Government Printing Office, Washington 25, D. C. (1952).
10. *Modern Plastics*, Aug. 1952, p. 5.
11. "Chemical Economics Handbook," Vol. 2, Section V, Stanford Research Institute.
12. *Plastics World*, Mar. 1953, p. 4.

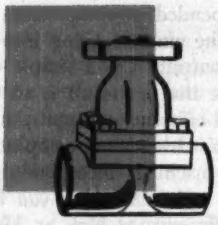


now!

diaphragm valves

... of chemical-resistant

ACE SARAN or PARIAN (Polyethylene)



Here's an all-purpose valve that combines the unique corrosion resistance of Ace plastics with the efficient Saunders diaphragm principle . . . a valve that cuts costs wherever corrosive liquids or gases are handled at normal temperatures and pressures.

Body is molded of Ace Saran or Parian. Diaphragm may be rubber, neoprene or polyethylene. Corrosives never touch metal. Bonnet assembly is sealed off from the solution. No stuffing box to leak. It can be serviced without removing from line—all parts are interchangeable. All sizes from ½ to 2 in., standard pipe threads. Working pressure 50 psi. at 77 deg. F.

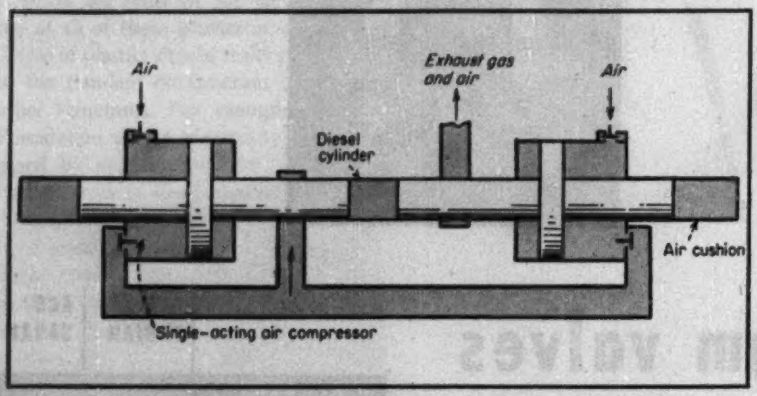
Use Ace Saran and Parian pipe and fittings too, to make a completely protected system. You'll also be interested in the complete line of Ace hard rubber and rubber-lined chemical equipment. Write today for bulletins.

REAGENT	ACE PARIAN RATING	ACE SARAN RATING
Sulfuric acid, conc.	Good	Good
Sulfuric acid, 60%	Good	Excellent
Sulfuric acid, 30%	Excellent	Excellent
Sulfuric acid, 10%	Excellent	Excellent
Hydrochloric acid, conc. (37%)	Good	Excellent
Hydrochloric acid, conc. (10%)	Good	Excellent
Nitric acid, conc. (70%)	Unsuitable	Good
Nitric acid, 10%	Fair	Excellent
Acetic acid, glacial	Unsuitable	Excellent
Acetic acid, 10%	Poor to Fair	Excellent
Hydrofluoric acid, 48%	Fair to Good	Excellent
Oleic acid, conc.	Unsuitable	Excellent
Sodium hydroxide, 50%	Good	Good
Sodium hydroxide, 10%	Good	Good
Ethyl alcohol (denatured)	Good	Excellent
Acetone	Good	Fair
Carbon tetrachloride	Unsuitable	Good
"Ethyl" gasoline	Unsuitable	Excellent
Benzene	Unsuitable	Fair
Xylene	Fair	Good
Lubricating Oil	Unsuitable	Excellent
Calcium chloride, 15% aq.	Excellent	Excellent
Calcium hypochlorite	Excellent	Excellent
"Duponol" ME, 10% aq.	Excellent	Excellent
Triethanolamine	Excellent	Good
Camphor Oil	Unsuitable	Excellent
Ferric sulfate, 15% aq.	Excellent	Good
Linseed Oil	Fair	Excellent
Formic acid	Good	
Saturated salt water	Excellent	Excellent

● This is partial list only . . . ask for complete data.

ACE rubber and plastic products

AMERICAN HARD RUBBER COMPANY
93 WORTH STREET • NEW YORK 13, N. Y.



FREE PISTON design eliminates crankshaft, connecting rods and bearings.

GAS GENERATED by this free-piston engine drives a 1,500 hp. turbine.

Free-Piston Gas Turbine . . .

. . . combines high thermal efficiency of reciprocating engine and high speed rotating power take-off of turbine. It means operating economy and flexibility. (A)

Application of gas turbines in the process industries has to date been limited. First large scale use of gas turbines was on Houdry process fixed-bed catalytic cracking units. Hot gas produced during regeneration of the catalyst drove turbines connected to air compressors and electric generators. Another application has been in driving gas pipeline compressors.

In common with engineers in other fields process engineers continue to watch gas turbine developments for possible utilization on their specific problems. With Cooper-Bessemer's introduction of the first commercial free-piston gas turbine in the U. S. A. engineers have a new machine to watch, analyze and ponder about. For here is a turbine said to offer higher over-all efficiency, 10 to 25 percent reduction on installed cost and require 30 to 60 percent less space than comparable conventional type gas turbines.

On conventional turbines hot pressurized gas, diluted with air, provides the driving energy. Common practice is to produce the gas by burning a suitable fuel continuously under pressure in a combustion chamber. And to ensure long life for both combustor and turbine, gas inlet temperature to the turbine must be kept below 1,500 deg. F.

To hold temperatures below this level compressed air must be introduced to the combustor to serve as a film coolant on the chamber walls and give the proper final gas temperature. Air requirements run as high as 500 percent in excess of stoichiometric needs.

This large quantity of compressed air is produced by work output from the turbine shaft driving a compressor. Energy expended for compression may be twice the amount going into useful work output. On a simple cycle gas turbine the net result is an over-all thermal efficiency of approximately 20 percent. Other more complex and expensive machines incorporating regenerators and intercoolers can boost thermal efficiency as high as 35 percent.

Heart of the new Cooper-Bessemer machine is a free-piston engine gas producer. This simple reciprocating engine combines the functions of gas producer and air compressor, relieving the turbine from the air compression load.

Shown in the simplified sketch are the basic elements of the free-piston gas producer. Two opposing free pistons are enclosed within a common diesel cylinder. Connected to the outboard end of each piston is a larger single acting compressor piston running within a compression cylinder. Outboard of the compression stages are the bounce pistons and cylinders.

Fuel is injected into the space between the diesel pistons when they are at inner dead-center position. As the fuel burns the pistons move outward compressing air within the compression cylinders and ducts. Near the end of the outward stroke exhaust ports are uncovered permitting the gas to start venting to the turbine. Immediately thereafter another set of ports is uncovered permitting compressed air to enter and scavenge the

Equipment Cost Indexes

(Marshall & Stevens Indexes, 1926 = 100)

Industry	Mar. 1952	Dec. 1952	Mar. 1953
Average of all.....	180.2	180.8	180.7
Process Industries			
Cement mfg.	172.8	173.0	172.7
Chemical	180.8	181.4	181.1
Clay products	167.8	168.0	167.7
Glass mfg.	170.9	171.4	171.1
Paint mfg.	174.1	174.7	174.4
Paper mfg.	174.4	175.0	174.7
Petroleum ind.	177.2	178.1	177.8
Rubber ind.	179.6	180.5	180.2
Process ind. avg....	178.2	178.9	178.6
Related Industries			
Elec. power equip...	182.4	183.3	183.0
Mining, milling	181.5	182.4	182.1
Refrigerating	200.3	201.2	201.0
Steam power	170.0	171.0	170.7

Compiled quarterly for March, June, September and December of each year by Marshall and Stevens, evaluation engineers, Chicago and Los Angeles. Indexes are prepared for 47 different industries, from which the eight process and four related industries listed here are selected. Published each month with the latest available revision. For a description of the method of obtaining the index numbers see R. W. Stevens, **Chemical Engineering**, Nov. 1947, pp. 124-6. For a listing of annual averages since 1913 see **Chemical Engineering**, March 1953, pp. 220, 221.

IN BRIEF—A capsulated listing of this month's newsworthy equipment.

Electrical & Mechanical Equipment		Page
Gas Turbine	Has free-piston gas producer, high efficiency	206
Safety Switch	Offers unique arc quenching action	207
Wireway	Provides speed and simplicity of installation	207
Short Circuit Protector	Stops "short" before crest of first quarter cycle	207
Cleaning Equipment	Employs ultrasonic energy to blast away dirt	207
Fluids Handling Equipment		
Throttling Valve	Combines advantages of diaphragm and disk valve	208
Polyethylene Valves	Available for 1 and 2 in. lines, standard flanges	208
Test Tank	Enables manufacturer to undertake mixer studies	208
Rubber Lined Flange	Has spacing lugs to prevent lining damage	208
Liquid Strainer	Rotating strainer drum is self-cleaning	208
Packaging & Handling Equipment		
Jute Bags	Have seamless construction, resist shock loading	210
Stacking Skid	Holds long pipe, angle iron, structural steel	210
Non-Swinging Crane Loads	Achieved with 3 point triangular suspension	210
Rotary Scraper	Can move and stockpile many bulk materials	210
Multiwall Bag	With non-skid surface does not slide	210
Car Loading Ramp	Made of magnesium is wider at dock end	210
Box Car Loader	Controlled from ground loads solids evenly	210
Fork Lift Truck	Performs several different handling functions	210
Fork Truck Unloader	Discharges bulky, unpalletized loads	212
Dry Feeder	Delivers constant flow up to 3,000 lb. per min	212
Vibrating Conveyor	Employs natural frequency, saves power	212
Unloading Platform	Adjusts hydraulically to required height	212
Magnetic Drum Feeder	Traps metals and feeds solids simultaneously	212
Safety Equipment		
Fire Detection Cable	Sensitive to flame heat, triggers fire alarm	214
Vacuum Cleaner	Recovers spilled mercury, eliminates hazard	214
Fire Extinguisher	Has simplified, faster-acting discharge valve	216
One Man Fire Engine	Delivers 150 lb. of pressurized dry chemical	216
Instruments & Controls		
Remote Level Gage	Permits long distance gaging within seconds	218
Flowmeter	Combines indicating, recording and totalizing	220
Level Control	For non-conductive materials over wide range	221
Static Detector	Is fully portable, indicates amount of charge	221
Level Control	Has electrodes which actuate solenoid valve	221
Flow and Level Meter	Uses magnetic coupling to isolate parts	222
Speed Recorder	For tachometer indicators, uses strip chart	222
Pressure Transmitter	Used in measuring flow, liquid level or density	223
Viscometer Indicator	Can be used where permanent record is not needed	223
Mass Flow Meter	Uses integrator to combine volume and density	224
Level Control	Depends on capacitive action of sheathed electrode	225
Gas Flow Meter	Features built-in calibration for specific gas	225
Giant Computer	Is said to make possible automatic processing	226

combustion gas. At the end of the outward stroke air pressure within the bounce cylinders is greater than pressure in the diesel cylinder so that the pistons are driven back to inner dead-center position.

Advantages inherent in the combination of a free-piston engine with a gas turbine stem from the thermodynamic efficiency of the diesel cycle. Remember that conventional gas turbines drawing gas from a combustor must do all their work of air compression and driving the load at a temperature level limited by the endurance of construction materials.

Fuel burning in the diesel cylinder does its work at a much higher temperature level. This is more efficient thermodynamically. As work is done the gas expands and cools so that diluent air requirements are less in order to produce gas at the proper temperature for driving the turbine.

High temperature in the diesel cylinder is momentary and cyclic thus standard metals can be used for fabrication. Furthermore the gas-air mixture delivered to the turbine is at 1,000 deg. F. which also can be tolerated by standard materials. For instance, cast iron is used in major parts of the gas producer and a nodular iron casting suffices for the gas turbine inlet chamber.

First free-piston gas turbine built by Cooper-Bessemer was a 1,500 hp. machine. Engine operates at a cyclic frequency of 555 cpm. delivering 32,000 lb. per hr. of gas at 1,000 deg. F. and 72 psig. Turbine has 5 reaction stages and rotates at 14,400 rpm.

Compression ratio is flexible in the gas generator power cylinder. It can be varied to suit various fuel requirements and to facilitate cold starting. Also the generator is adaptable to supercharging to increase greatly the hp. output.

Simplicity of the free-piston engine design means a low center of gravity and complete freedom from vibration. Space requirements are low and foundations light.

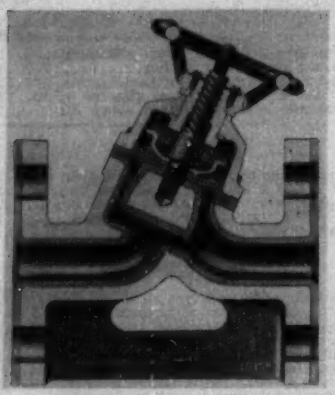
A continuous test program has been running on this equipment since January 1952. Test results are said to indicate clearly that the unit will operate at 38 percent over-all plant efficiency over a range of loads.—*Cooper-Bessemer Corp., 200 Thomas Ave., Mount Vernon, Ohio.*

(A) Safety switch employs a pole unit which is in effect a self-contained switch. A unique arc quenching action is similar in principle to the arc extinction features of modern circuit breakers.—*Trumbull Electric Dept., General Electric Co., Plainville, Conn.*

(B) Wireway is designed to speed, simplify installation. Straight sections are available in lengths of 1, 2, 3, 4, 5 and 8 ft., in cross-sectional sizes 4 x 4, 4 x 6, 6 x 6, and 8 x 8 in.—*Trumbull Electric Dept., General Electric Co., Plainville, Conn.*

(C) Short protection on 120/208 a.c. networks is provided by the 208 Amp-Trap. Unit stops a short-circuit current before it can reach the crest of its first one-quarter cycle.—*Chase-Shawmut Co., Newburyport, Mass.*

(D) Industrial cleaning equipment frees dirt with ultrasonic energy. Ceramic transducer element is key to Soniclean process.—*Detrex Corp., Box 501, Detroit 32, Mich.*



Throttling Valve Designed for Long Life — A

Advantages of both the diaphragm and disk type valves have been combined in the new Farris X-V series. These valves are designed for shut off and throttling control of acids, chemicals, and corrosive or abrasive fluids.

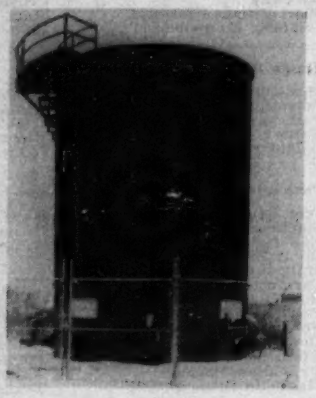
Flow is actually controlled by a disk seating against a port opening. However, the outer end of the valve stem is isolated from the flow system by a diaphragm seal. The inherent advantages of diaphragm sealing are obtained without the diaphragm being subjected to seat wear and abrasion.

Disk is constructed with an ample covering of resilient surface material for closure over fine grits. Among other design features are replaceable disk, corrosion resistant materials, full port capacity, and easy-to-read valve position indicator.

Valves are manufactured with either cast iron, 316 stainless steel or Hastelloy C bodies. They are available either unlined or lined with the same material as the diaphragm and disk. Sizes range from ¼ through 4 in. Connections are flanged, screwed or union. Diaphragm motor-operated valves are also available.—*Farris Flexible Valve Corp., 501 Commercial Ave., Palisades Park, N. J.*

Polyethylene Valves Made in Two Sizes — B

Polyethylene valves are now available for 1 and 2 in. lines. Fabricated of polyethylene throughout these valves are very lightweight; a 2-in. valve weighs less than 6 lb. Valves are furnished with standard drilled flanges for easy incorporation into existing installations or for use in new pipe line assemblies. — *American Agile Corp., P. O. Box 168, Bedford, Ohio.*



Large Tank Aids Mixer Studies — C

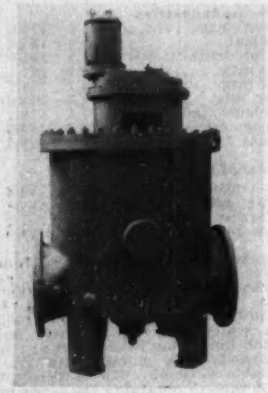
A recently erected 70,000 gal. test tank is expected to give accurate data on blending of fluids in large tanks. Studies can be made on single and multiple installations of side entering mixers, location of multiple units and angle of entrance for mixers. Comparisons between mechanical mixers, air agitation and liquid jets are possible.

New mechanical design features can also be tested. Accurate instrumentation has been provided for securing power measurements.—*Mixing Equipment Co., Ins., 1024 Garson St., Rochester, N. Y.*

Protective Flanges Join Rubber-Lined Pipe — D

Danger of rubber lining failure by crushing at the pipe flange faces is eliminated with the Spacelok flange. Cast-in spacing lugs on the flange face contact the metal face of the adjoining flange. Thus the sealing gasket and flange rubber are enclosed in a metal cage and are compressed to exactly the correct degree when bolts are fully tightened.

While unit cost is slightly higher, installed cost is said to be lower. Extreme care formerly required in installation has been eliminated.—*The Polson Rubber Co., Garrettsville, Ohio.*



Liquid Strainer Is Self-Cleaning — E

Fine suspended particles can be removed from raw or process water and other industrial liquids by a new rotating drum self-cleaning strainer.

Drum is mounted on a vertical shaft and housed in a cast iron body. Water or other liquid to be strained enters through an inlet at the bottom of the housing and rises on the outside of the revolving drum. Liquid passes through the drum while dirt is retained on the surface of the strainer elements. Clarified liquid flows down the center of the drum to the outlet which is diametrically opposite the inlet.

A backwash orifice is provided to remove dirt from the strainer elements as the drum rotates. Backwash flow depends on the pressure differential between the interior of the strainer and atmospheric pressure. Strainer media are selected to satisfy the dirt removal requirements. Corrosion resistant materials of constructions can be furnished on special order.

Strainers are available in sizes to fit pipe lines ranging from 2 to 36 in. Rotational speed is 6 rpm.

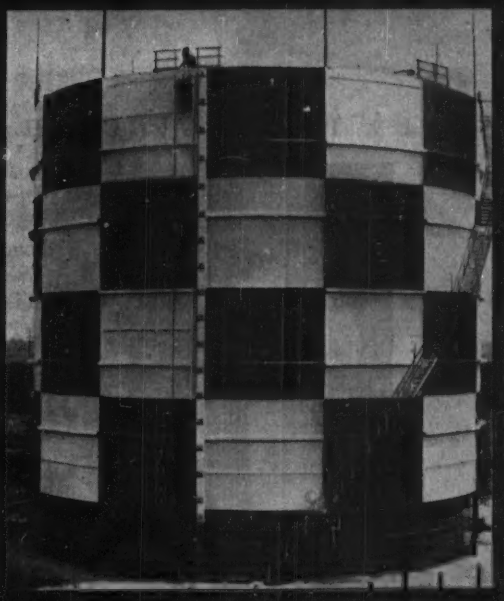
Another variation of this strainer operates with the drum in a stationary position. Whenever the strainer element needs cleaning backwash and drum rotation are performed manually.

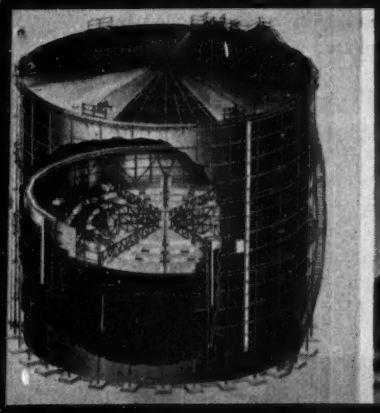
This unit is designed primarily for rough straining and is furnished for pipe sizes ranging from 2 to 24 in.—*S. P. Kinney Engineers, Inc., 201 Second Ave., Carnegie, Pa.*

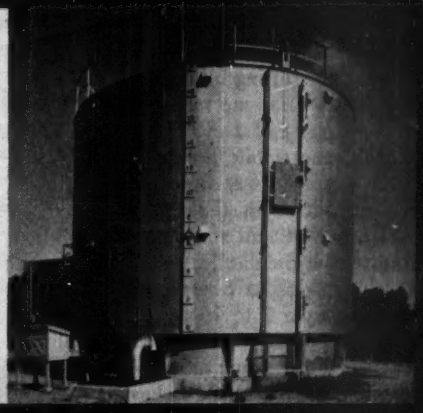
simple! proved in use!

Wiggins Gasholder

BY GENERAL AMERICAN





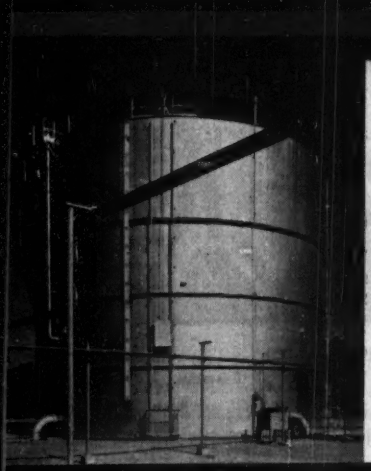


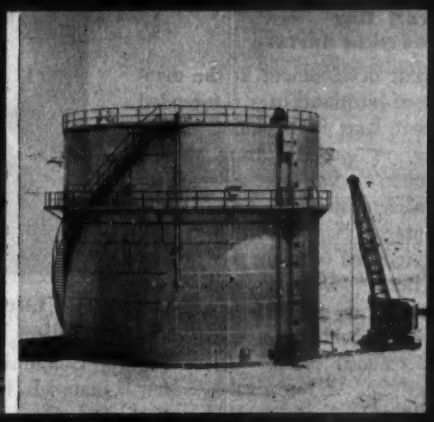
The only gasholder that uses

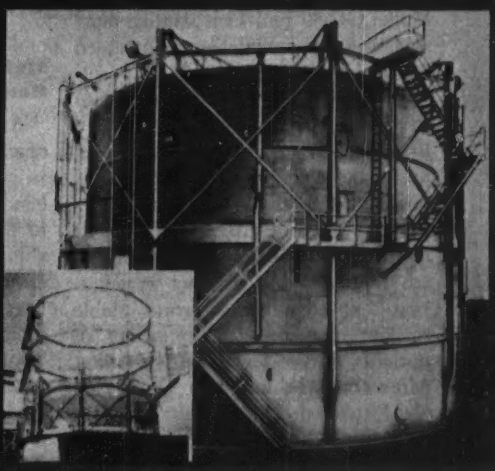
NO WATER
NO TAR
NO GREASE

The only gasholder that assures you

NO WEATHER WORRIES
NO OPERATING COSTS
NO MAINTENANCE PROBLEMS







You can convert your old style gasholders to get the Wiggins advantages!

GENERAL AMERICAN

WIGGINS VAPOR SEALS
GENERAL AMERICAN
TRADE MARK

TRANSPORTATION CORPORATION

General Sales Office: 135 South La Salle Street
Chicago 90, Illinois
Offices in principal cities

Be sure to get the performance record on the only modern gasholder before you plan any gasholder construction.

Seamless Jute Bags Resist Shock Loading **A**

Cloth for jute shipping bags is now being woven in a seamless tube, thereby eliminating seams. Bags using this material are said to be highly resistant to shock loading. In England widespread use of these bags is found for shipping chemicals, sugar, coffee, etc.—*Fairbairn Lawson Combe Barbour, Ltd., Leeds 1, England.*

Stacking Skid for Pipe and Steel **B**

Pipe, angle iron, structural steel and other long items can be handled and stored as unit loads with the Model GC-50 Phil-Tier. Unlike most skid units, the Phil-Tier is designed for stacking.

Featuring an all-welded steel construction, the new Phil-Tier has a heavy-gage corrugated deck with corner stakes permanently welded in position. Capacity is 4,000 lb.; tiering capacity is 16,000 lb. Overall height is 30 in., but deck width and length are produced to customer specification. Leg construction assures stable stacking and prevents spreading of uprights on the lower unit.—*Phillips Mine & Mill Supply Co., 2300 Jane St., Pittsburgh 3, Pa.*

Three-Point Suspension Stops Crane Load Swing **C**

The dangerous and time-consuming pendulum effect of swinging crane loads has been eliminated in a newly designed load suspension. Hoisting ropes have been arranged to form a triangular suspension. This permits a load to be held rigidly in place, eliminating longitudinal, lateral and rotational sway. Thus, a load can be raised or lowered through a considerable distance, yet remain as rigid as though guided in an elevator shaft.—*Cleveland Tramrail Div., The Cleveland Crane & Engineering Co., Wickliffe, Ohio.*

Rotary Scraper Operates Efficiently **D**

Salt, gypsum, bentonite, light sands and similar materials are said to be moved and stockpiled with unusual efficiency by the Miller rotary scraper. Wet or mucky materials can also be handled with ease.

Utilizing an automatic vane loading principle, the machine eliminates drag and loading pressure by lifting material away from the cutting blade as it scrapes. The steel vanes are mounted around the periphery of a cylindrical barrel. As the vanes rotate they constantly clear material away from the blade and deposit it in the carrier hopper. Blade adjustment and dumping are controlled hydraulically.

Six available models have carrier capacities ranging from 2 to 16 cu. yd. Removable front dollies permit direct hook-up to tractor or prime mover.—*Consolidated Distributors, Selma, Calif.*

Multiwall Bag Has Non-Skid Surface **E**

A recent development in the manufacture of multiwall bags is intended to prevent bags from sliding during handling. A special coating applied to the outer surface of the bag gives it high skid resistance.

Advantages claimed for the new bags are reduced breakage due to bags falling from fork trucks and stacks, labor savings on the clean-up detail, and reduced likelihood of transit damage due to load shifts.—*Union Bag & Paper Co., 233 Broadway, New York 7, N. Y.*

Car Loading Ramp Flares From Car to Dock **F**

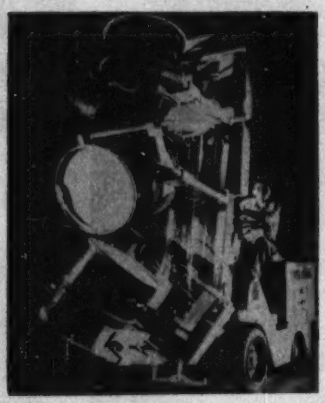
Light weight magnesium construction and a surface which flares to increased width at the dock are features of a new car-loading ramp. Width at the car door is 60 in. increasing to 84 in. at the dock.

Plate surface is diamond design for non-skidding. Edges are bevelled to avoid jarring trucks passing over the ramp. Ramps are made for 3,000, 6,000, 8,000 and 10,000 lb. capacities.—*Penco Engineering Co., 25 California St., San Francisco 11, Calif.*

Solids Thrower Loads Box Cars **G**

This centrifugal thrower unit loads granular and small lump bulk material into box cars. Loader unit is mounted on a sloping feed chute which pivots into the car. Operator can load and trim car without entering. Throw direction is controlled by a chain operated wheel from the loading dock.

Material is thrown by a high-speed belt held in a concave path by two idler disks along its outside edges. Due to centrifugal action, particles are hugged tightly against the belt and quickly pick up speed. Materials easily are thrown to box car corners at rates up to 80 tons per hr.—*Stephens-Adamson Mfg. Co., Aurora, Ill.*

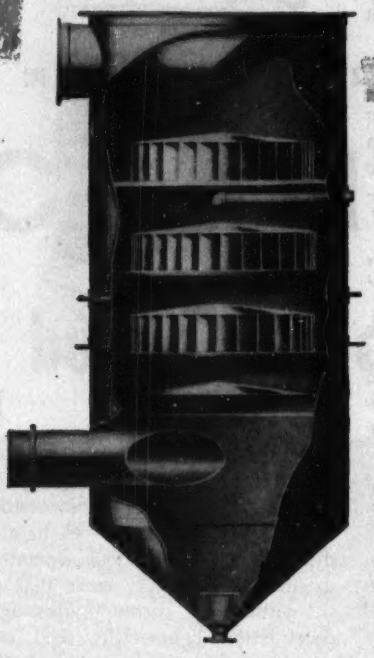


Fork Lift Truck Handles Variety of Loads **H**

Combining a number of different materials handling functions in one fork lift truck has prompted its designers to name it the Octopus. Rated at 4,000 lb. this truck uses four attachments: a revolving head (semi-permanent), drum clamps, hydraulic drum up-ender and clamp spikes. All attachments are quickly detachable.

Among the jobs handled by this truck are pallet transfer; side shifting to spot loads in tight areas; hauling and stocking of drums and paper

Two Years without Maintenance



A dust collector of this design was constructed entirely from 14-gage HASTELLOY *alloy B sheet to resist severe corrosive conditions.*

Handling...

Hydrochloric Acid Vapors
Sulphuric Acid Mist
Nitrous Oxide
Chlorobenzol
Toluol
Aerated Benzol
Aromatic Amides

Three HASTELLOY alloy B dust collectors have just completed 2 years' steady service handling these corrosive chemicals. They are used in a large chemical plant to wash reaction gases and to reclaim many valuable chemicals.

HASTELLOY alloy B has excellent resistance to hydrochloric acid in all concentrations, even to the boiling points. It also has good resistance to sulphuric acid and many other chemicals. The alloy can be fabricated into practically any type of chemical equipment.

For information on the resistance HASTELLOY alloy B has shown to many corrosive media and on fabrication procedures, write for a copy of "HASTELLOY High-Strength, Nickel-Base, Corrosion-Resistant Alloys."

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

"Haynes" and "Hastelloy" are trade-marks of Union Carbide and Carbon Corporation.

rolls; dumping, hauling and stacking of tote boxes; emptying of drums; and lifting of baled material.—*The Baker-Raulang Co., Baker Industrial Truck Div., 1230 West 80th St., Cleveland 2, Ohio.*

Fork Truck Pusher Discharges Bulk Loads **A**

A hydraulically operated load pusher discharges bulky, unpalletized loads from lift truck forks. Load transfer is speeded and manual handling eliminated. Highway carriers can be loaded from the tail gate as first-in units are moved forward by each succeeding load.

Positive control over pushing pressure guarantees smooth handling of any load regardless of its fragility. Installed on trucks in the 2,000 to 6,000-lb. range, the pusher reduces load capacity only 10 percent.—*The Baker-Raulang Co., Baker Industrial Truck Div., 1230 West 80th St., Cleveland 2, Ohio.*

Dry Feeder Delivers Constant Weight **B**

A new dry solids feeder delivers an uninterrupted flow of material to processing equipment at constant rates up to 3,000 lb. per min. It is said rate can be held constant within plus or minus 1 percent.

Material enters the feeder through a large inlet opening and drops onto a conveyor belt. The belt carries the solids past a regulating gate over a scale mechanism and out a discharge opening at the bottom of the feeder.

Automatic control of feed rate is provided by the regulating gate. Variation in weight of material passing over the scale mechanism produces automatic gate adjustment to compensate for the variation.

A counter on the side of the feeder records the duration of any run in hundredths of a minute. To get total amount of material delivered you multiply this time reading by the beam poise setting of pounds per minute.

Two models of the feeder are available. One model has a 9-in. stream width and will deliver from 75 to 1,500 lb. per min. The other has an 18-in. stream width and will handle from 150 to 3,000 lb. per min.—*Richardson Scale Co., Clifton, N. J.*

Natural Frequency Key to Conveyor Economy **C**

A new concept in operation of vibrating conveyors drastically reduces power costs, maintenance, and down time. Units operating on this principle are called natural frequency conveyors.

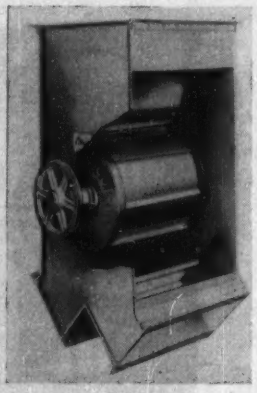
Conveyor action is similar to that of a child rocking back and forth in an outdoor swing, where only a flick of the wrist is required to maintain the swing's pendulum motion. In similar fashion, the drive on natural frequency conveyors is timed to vibrate or oscillate the tray at the natural frequency of the mounting springs.

Result of this type of operation is that you pay only for the power required to convey materials. Virtually no power is required to operate the empty conveyor.

In turn, it is said capacity is at least twice as great as other conveyors on the market, width for width and horsepower for horsepower. Material moves up to 24 in. per sec. on flat hauls. The conveyor requires ¼ hp. per 25 tons conveyed for each 10 ft. of level length.—*Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.*

Adjustable Platform Smooths Loading Hump **D**

An unobtrusive adjustable platform in front of your loading dock serves to bring the back of highway carriers to the correct level for smooth unloading. Platform can handle 40,000 lb. by means of a heavy-duty electric hydraulic system. Platform deck has a checkered plate surface carried on a framework of standard structural beams and channels welded throughout. Standard size is 10 x 12 ft.—*Rowe Methods, Inc., 2534 Detroit Ave., Cleveland 13, Ohio.*



Magnetic Drum Acts as Feeder **E**

Improvements and modifications have been announced on the Eriez line of magnetic drum separators. Units now incorporate changeable sheave sizes for various operating speeds; stainless steel shells that resist pitting and corrosion; dust-tight construction; light-weight, rigid, cast aluminum sides; adjustable feeder assemblies; smooth running and oil-sealed bearings; and extended discharge ducts.

Design of the magnetic drum consists of a revolving cylindrical shell within which a stationary high-powered Alnico V permanent magnet is located. Material is fed into the drum hopper where the flow is regulated by a feeding device. As material reaches the drum the magnetic field attracts and holds ferrous particles to the revolving shell.

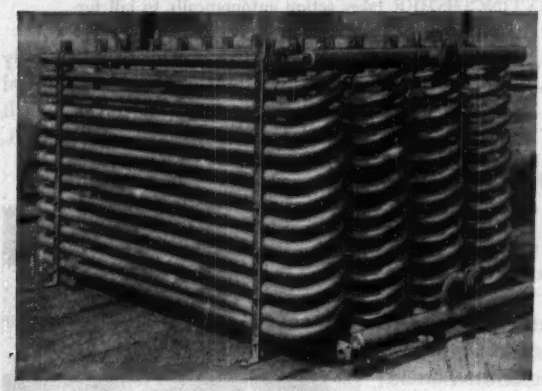
Rotation of the shell carries the material through the magnetic field. Non-magnetic solids fall free at the natural tangent point; ferrous particles are held until carried beyond a divider and out of the magnetic field.

Two models, DF-101 and DF-102, are available. Model DF-101 acts as a feeding device as well as a magnetic separator, since it is fitted with fins on the drum surface. Model DF-102 has a smooth shell and is usually installed at the discharge of an open or closed chute, spout or screw conveyor.—*Eriez Mfg. Co., 7 East 12th St., Erie, Pa.*

IN 5 MODERN FABRICATING SHOPS

CRANE

builds pipe coils to DESIGN perfection



2-in. ammonia cooling coils with welded headers and ammonia flanges.

You get the results you planned for in pipe coils built by Crane. And right along with this close adherence to specification goes a greater dependability that enhances your design.

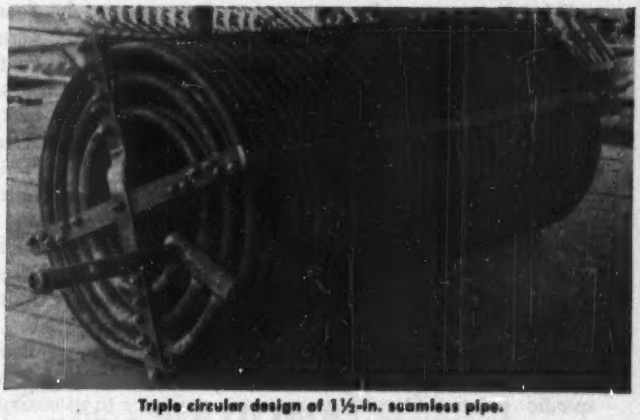
Although seamless carbon steel pipe is most popular, Crane has the experience—and the equipment to produce pipe coils in wrought iron, copper, brass, nickel, aluminum, 18-8 of various types, and miscellaneous alloys. At your service are the finest facilities for heat-treating, stress-relieving and testing of all kinds. Crane can also supply those necessary piping accessories to give your design the added value of consistent quality throughout.

There's further information on this important Crane service in your Crane No. 53 Catalog—and in the 48-page Pipe Coil Handbook, offered below.

FREE 48-PAGE PIPE COIL HANDBOOK

Gives Valuable Design and Specification Data

Dimensions, materials, and connections, pipe data, helpful engineering information—you'll find it all in this factual, easy-to-read handbook, free to pipe coil designers and users. Drop a card to Crane at the address below for your copy (Circular 318).

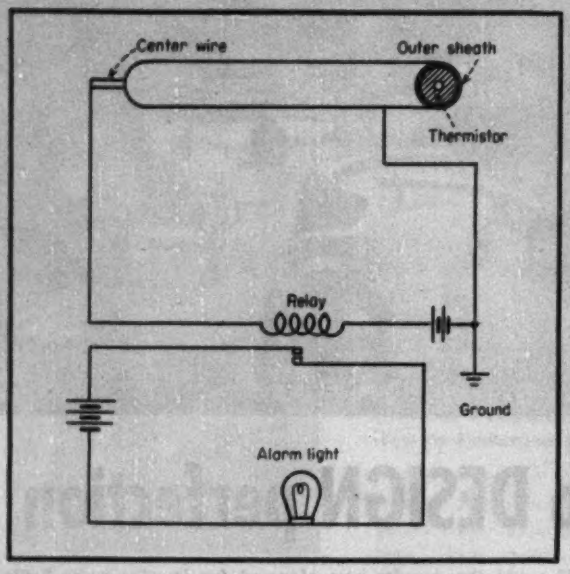


Triple circular design of 1½-in. seamless pipe.

CRANE CO.

General Offices:
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



ALARM circuit operates when flame heat hits thermistor.

EXTINGUISHER takes action automatically to kill fire.

Cable Triggers Fire Alarm

Flame contact with cable at any point for 2 or 3 seconds will set off alarm or start extinguishing system. Cable does not decompose or deform; will re-alarm. (A)

A recently developed fire detection cable looks like a heavy wire or small tubing. Yet touch it with a flame and you'll get practically instantaneous action; action that will doom a fire before it gets a toehold.

What happens is really very simple. There is an electric circuit which includes the heat sensitive cable, a relay, a suitable alarm and extinguisher. Under normal temperature conditions the cable acts like an open switch. Although there is a voltage potential across the system, no current flows. As soon as a flame touches the cable the result is the same as closing a switch. Current flows to actuate the alarm and extinguisher.

Since the cable is heat sensitive along its entire length detection is effective over an area rather than at specific points. Over-all protection by this detection system is much greater than offered by fire detection systems generally.

Despite fast reaction of the cable to flame heat it is not affected by normally high ambient temperatures. However, the same type of cable can be designed to operate warnings for excessive ambient temperatures. This type of service fits process needs rather than fire detection.

An outstanding feature of this system is complete freedom from need for electronic amplification. Current flow actuated by flame heat is sufficient to operate warning and extinguisher. This eliminates one element of maintenance and keeps cost low.

In general the heat sensitive cable resembles a coaxial cable. However, instead of a dielectric between the center wire and outer sheath there is a thermistor—a semi-conductor whose resistance decreases very sharply as temperature increases. At normal temperatures the resistance is in the megohm range.

Application of flame heat to the cable immediately lowers thermistor resistance to approximately 100 ohms. Current then flows between the inner wire and the outer sheath closing the relay to actuate the alarm.

Heat from the fire does not damage the thermistor material. It can react repeatedly without replacement. Exposure to ambient temperatures up to 500 deg. F. can be tolerated.

System can operate on any supply voltage. A transformer in the control provides correct system voltage which is said to be fairly low.—*Thomas A. Edison, Inc., West Orange, N. J.*

Vacuum Cleaner Cleans Up Menace **B**

When mercury spillage occurs, the mercury must be picked up at once due to the hazards produced by evaporation. Viewed by means of an ultra violet light and fluorescent screen, the evaporation of mercury from a small spill at room temperature looks much like the smoke from a lighted cigarette. Equilibrium concentration of mercury vapor at room temperature of 77 deg. F. is over 20 mg. per cubic meter. The accepted maximum allowable concentration is 0.1 mg. of mercury per cubic meter of air.

Dependable recovery of mercury globules and mercury laden dust can be secured with the Mer-Vac indus-

Get

something extra

when you buy

lead sheet

When you place an order for lead sheet, chances are you state quantity, composition, size and weight, and that's all.

When you buy from National, you not only get sheet that meets these four specifications but you also get certain "extras"—extras characteristic of the *high quality* lead sheet made by the leader in lead.

Such as

(1) The grade of lead acknowledged best for acid-handling—St. Joe Chemical Lead.

(2) A smooth, even finish.

(3) A surface as free of flaws as careful milling can make it.

(4) Uniform over-all gauge.

(5) Maximum structural strength throughout.

These extras contribute to adaptability, workability, and durability – whether the sheet is used for handling corrosives, for architectural installations, or for radiation barriers.

It is these extra qualities, not specifically stated in your order, that give National Lead sheet its dependability on the job.

That's why we say—when you want lead sheet—come to National. And get something extra.

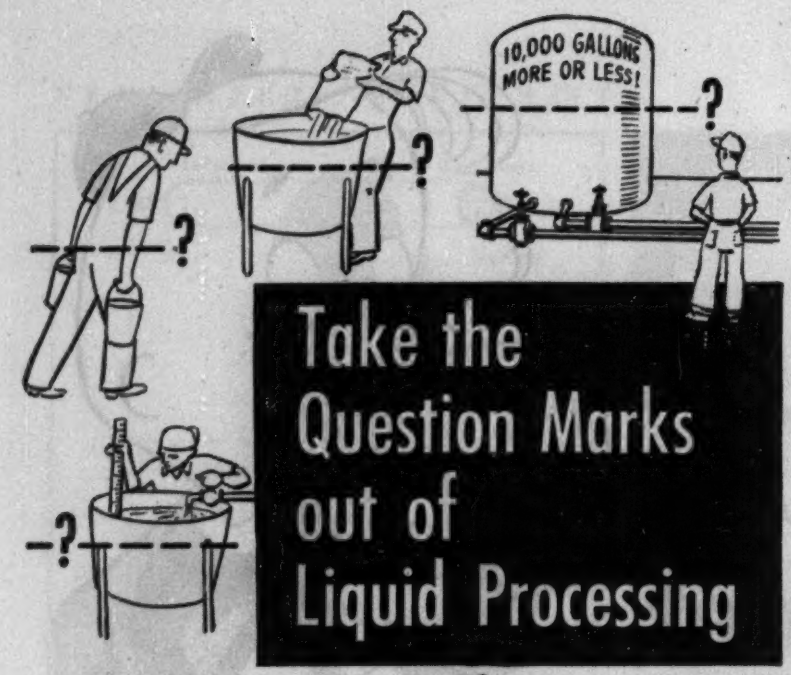
Sheet Lead

with a NATIONAL reputation

LEAD COMPANY

New York 6; Atlanta; Baltimore 3; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; Dallas 2; Philadelphia 25; Pittsburgh 12; St. Louis 1; New England: National Lead Co. of Mass., Boston 6; Pacific Coast: Morris P. Kirk & Son, Inc., Los Angeles 23, Emeryville 8 (Calif.), Portland 10, Seattle 4; Canada: Canada Metal Co., Ltd., Toronto 8, Montreal, Winnipeg, Vancouver.

*Reg. U. S. Pat. Off.



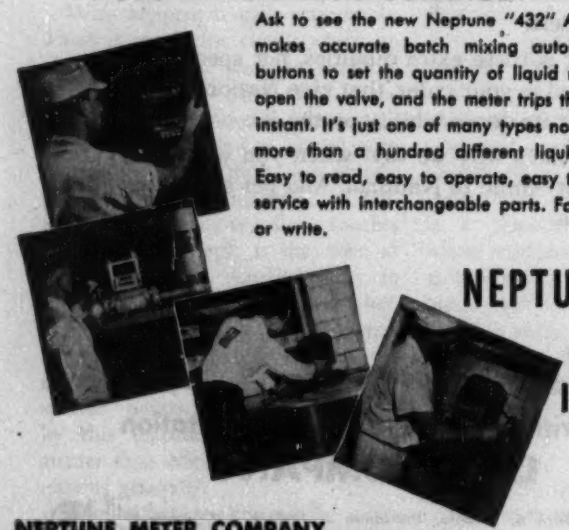
Take the Question Marks out of Liquid Processing

WITH *Accurate* NEPTUNE METERS

Why use wasteful methods of measurement when *accuracy* is so easy with Neptune meters? Fine-instrument precision gives you constant control over product quality at all times. No chance for human errors—the meters quickly pay for themselves by putting an end to spoiled batches, over-filling, spillage, etc. They save time, too, by eliminating slow weighing or batch tanks. Simple, easy to clean, they boost good housekeeping by keeping messy or hazardous liquids inside the pipe.

AUTOMATIC BATCH CONTROL

Ask to see the new Neptune "432" Auto-Stop—the meter that makes accurate batch mixing automatic. You simply push buttons to set the quantity of liquid required by the formula, open the valve, and the meter trips the valve shut at the right instant. It's just one of many types now available for handling more than a hundred different liquids. Composition bronze. Easy to read, easy to operate, easy to calibrate, and easy to service with interchangeable parts. For quick facts, just phone or write.



NEPTUNE METERS for *100* Industrial Liquids

NEPTUNE METER COMPANY
50 West 50th Street • New York 20, N. Y.

Branch Offices ATLANTA • BOSTON • CHICAGO • DALLAS • DENVER • LOS ANGELES • LOUISVILLE • NO. KANSAS CITY, MO. PHILADELPHIA • SAN FRANCISCO • PORTLAND, ORE. • Canadian Factory: TORONTO 14, ONT.

trial vacuum cleaner. This unit combines an enlarged gas-mask canister for mercury vapor collection and a powerful vacuum cleaner for mercury recovery.

Included in the design features are a synchronous timer indicating when canister contents must be replaced; a special air circulation system for the motor to prevent amalgamation of wiring connections and parts; a glass trap for mercury recovery; stainless steel and porcelain enameled canister parts; acid resistant dust filter. Efficient recovering of mercury globules is effected by an extra high lift centrifugal vacuum pump.—*Acme Protection Equipment Co., 3037 West Lake St., Chicago 12, Ill.*

Fire Extinguisher Has New Discharge Valve A

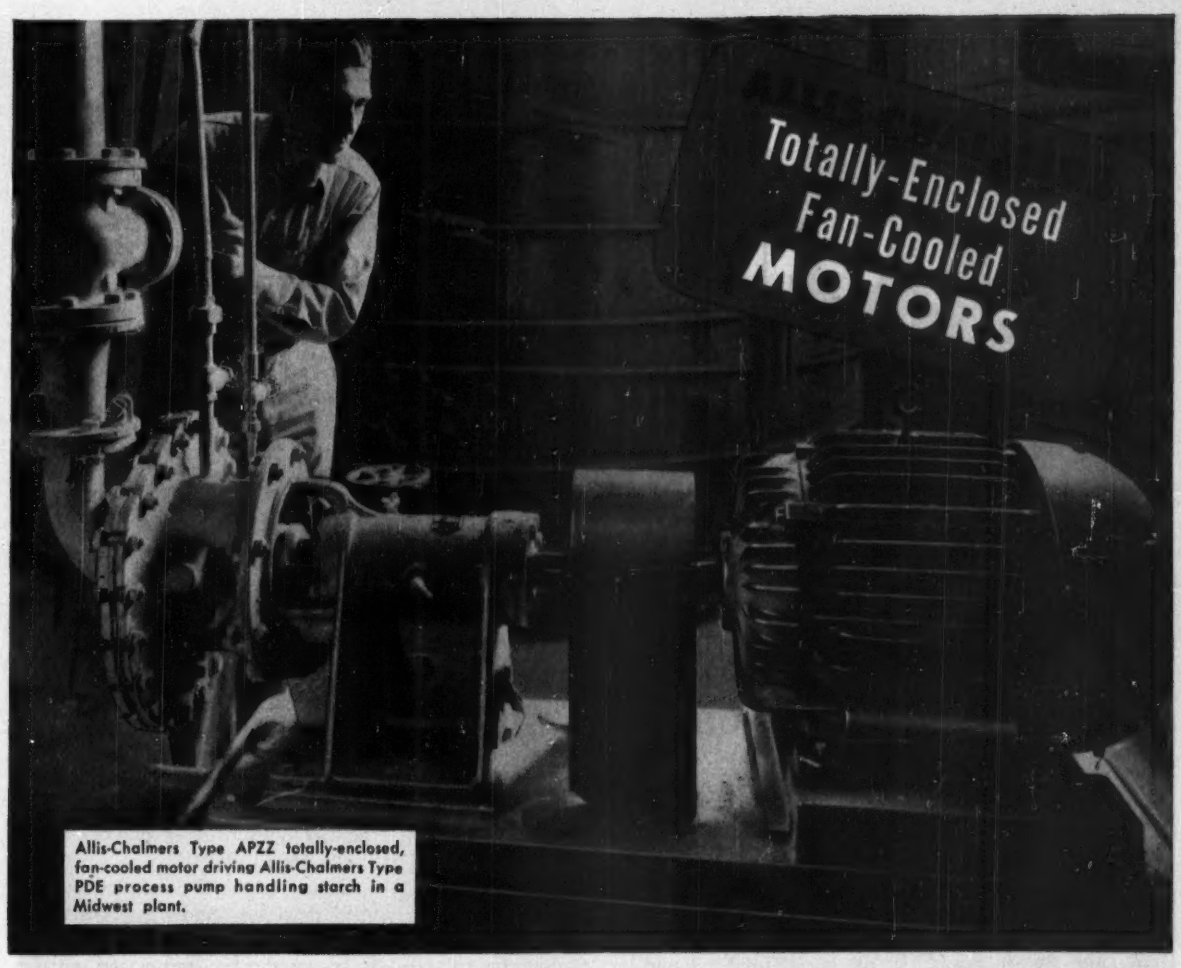
A new line of portable carbon dioxide fire extinguishers features a simplified faster-acting discharge valve. Valve can be disassembled for servicing without using special tools. Location of the squeeze lever directly over the valve stem gives quicker discharge. Only finger pressure is required. Valve has removable syphon tube and the safety disk is side mounted for added protection against damage.

Available model numbers of this design are 2½, 5, 10, 15 and 20. Model numbers denote also the weight capacity of the respective units.—*American-LaFrance-Foamite Corp. Elmira, N. Y.*

One Man Fire Engine Kills Large Scale Fires B

One man can successfully cope with large scale class B and C fires if he has access to a model 150 dry-chemical wheeled extinguisher. Fully charged the unit weighs 480 lb. and delivers 150 lb. of pressurized dry chemical. It can be easily wheeled, maneuvered and operated by one man.

Dry nitrogen expellent holds a sustained operating pressure of 200 psi. during the entire period of discharge. All the dry chemical can be discharged in approximately 45 sec., if necessary. However, the nozzle control permits the discharge to be started and stopped at will.—*American-LaFrance-Foamite Corp, Elmira, N. Y.*



Allis-Chalmers Type APZZ totally-enclosed, fan-cooled motor driving Allis-Chalmers Type PDE process pump handling starch in a Midwest plant.

Get These 3 Low Maintenance Features

1 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

2 Cast Iron Construction

Frame, conduit box and fan cover of cast iron resist corrosion. Fan is non-sparking, corrosion-resistant material. Well suited to outdoor operation.

3 Pre-lubricated Bearings

Ball bearings are double-shielded type, pre-lubricated at the factory. Periodic lubrication is not required under normal operating conditions, but provision is made for in-service lubrication if necessary.

GET COMPLETE INFORMATION on Allis-Chalmers motors for indoor and outdoor service — complete with Allis-Chalmers coordinated control — from your nearby A-C Authorized Distributor or District Office, or write for Bulletins 51B7286 and 51B7149. Allis-Chalmers, Milwaukee 1, Wisconsin.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

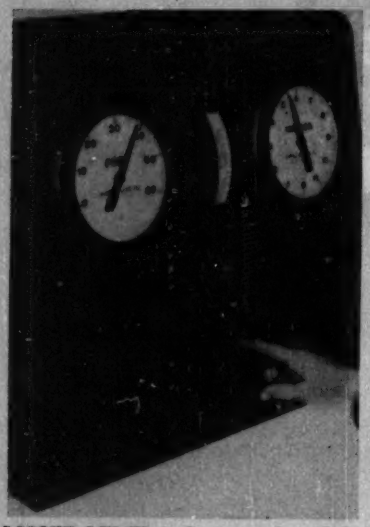
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

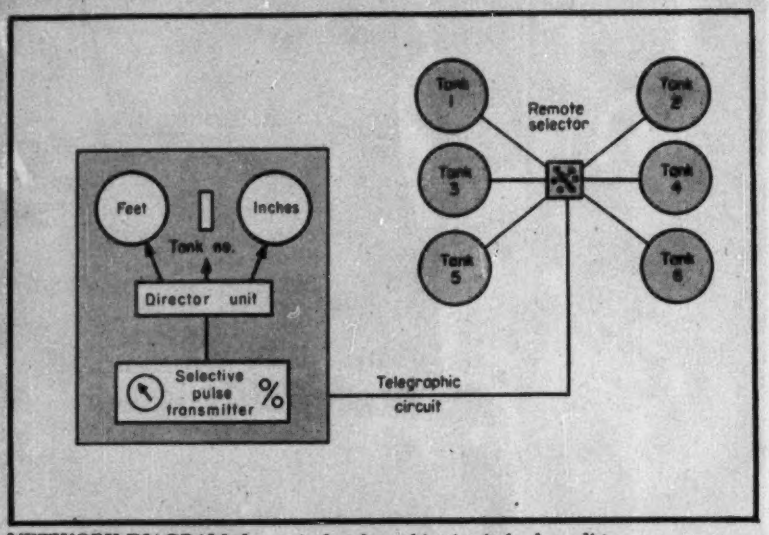
PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

A-4037



LIQUID LEVEL is shown on these dials.



NETWORK DIAGRAM shows single telegraphic circuit for long distance.

Level Gaged by Remote Control

In an office, far distant from a tank farm, a man turns a dial and flips a switch. Within seconds an automatic signal gives a precise dial reading of tank liquid level. (A)

Pushbutton operation has come to the job of measuring liquid levels in large storage tanks. In its latest form distance is no barrier. From a control station in New York an operator can gage one or more tanks in Texas or California; the entire sequence is performed in exactly 25 seconds.

Previously, remote gaging of liquid levels could not be done at a distance greater than 5 miles. Even at this distance the systems used were very expensive.

In the Varioplex system of remote liquid level gaging the problems of distance and cost have been overcome. The transmission components can be used with the manufacturer's present automatic liquid gaging equipment. Signals can be transmitted over existing private or leased telephone or telegraph wires or by microwave.

While initial installations of the Varioplex system will be confined to liquid gaging problems it is felt the system can be applied to bulk storage of dry materials. Work is also underway on transmission of temperature readings.

To understand how the Varioplex system works we will start at the individual tank. Actual measurement of the liquid level is done by a standard automatic float gage. This unit consists of a float that rides up and down a set of guide wires inside the tank. Attached to the float is a tape that goes up through the top of the tank via a duct to a ground-level wind-up drum and viewing station.

Located at the ground level station is the Varioplex transmitter. Two indexing disks, one each for feet and inches, are contained within the transmitter. These disks are connected to the float level gage mechanism. As the liquid rises and falls within the tank the disks assume rotational positions proportional to the liquid level. Measurement of the angular displacement of the individual disks from the zero position, therefore, gives a measurement of fluid level.

Measurement of the angle of displacement is accomplished telegraphically by release of a sweep mechanism. Duration of the telegraphic impulse transmitted by the sweep corresponds to degrees of angular displacement.

At the receiving station incoming telegraphic impulses control ratchet stepping mechanisms. These in turn cause angular displacement of dial pointer-indicators corresponding exactly to the angle of displacement of the transmitter disks. Readings on the dial indicator faces give the liquid level within $\frac{1}{4}$ in.

Gaging sequence is started by the operator at the remote gaging station. The telegraphic start impulse serves to trigger the transmitter starting the motor which powers the sweep mechanism. At the conclusion of the gaging operation a local stop impulse is generated to stop the sweep drive and position the sweep at the zero position.

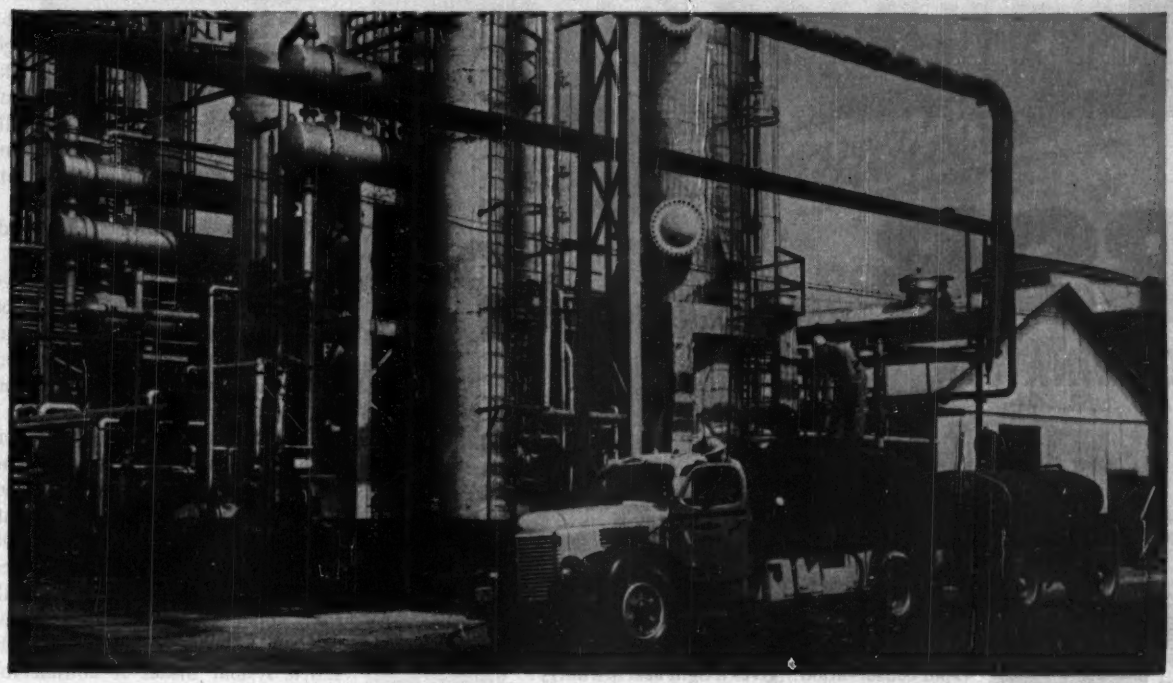
Two system networks are used to meet the requirements of either relatively close proximity or long distance separation of gaging station and tank location.

On a relatively close proximity network each tank transmitter is connected to the remote gaging station by two electrical conductors. One conductor is connected to the foot indicating dial; the other to the inch indicator. Interconnection of the gaging station receiver with the individual tank line is accomplished by means of the selector switch on the control panel.

Where long distance separates gaging station and tank location it is uneconomic to provide multiple electrical conductors between the two points. To meet this situation a network modification is required. A re-

HEAT EXCHANGER EFFICIENCY RESTORED BY DOWELL SERVICE

Scale deposits removed by chemistry without dismantling equipment . . . without production shut-down



When scale and sludge accumulate on your heat transfer equipment, there's bound to be a reduction in efficiency with an increase in operating costs.

The Dowell method of removing scale and sludge *by chemistry* has been accepted by thousands of plant operators as a fast, safe and economical way to help restore efficiency to equipment.

Dowell was recently called upon to clean three badly fouled heat exchangers in a refinery. Dowell engineers pumped liquid solvents into the areas of the exchangers to be cleaned. Then, after sufficient reaction time, the spent solutions were flushed from the units, along with the sludge accumulations. After cleaning, one unit could carry the load previously carried by all three.

The Dowell method is fast and economical because solvents are pumped into equipment through regular connections without dismantling. Many types of equipment can be cleaned while in operation. No special devices or rig-ups are needed. It's efficient, too, because these solvents reach wherever steam and water flow. Even the most complicated heat transfer surfaces—angles, curves, piping—have been cleaned effectively in this manner.

Furthermore, Dowell furnishes the trained personnel, the truck-mounted tanks, pumps, heaters, mixers and control equipment to do the job.

What's *your* cleaning problem? Dowell engineers will be glad to talk with you about better, faster and more economical ways to clean your equipment. Contact your nearest Dowell office today. Or, write directly to Tulsa, Dept. G-33.

DOWELL SERVICE

Over 100 Offices to Serve You with Chemical Cleaning for:

Boilers • Condensers • Heat Exchangers • Cooling Systems
Pipe Lines • Piping Systems • Gas Washers • Process Towers
Process Equipment • Evaporators • Filter Beds • Tanks

Chemical Services for Oil, Gas and Water Wells

DOWELL INCORPORATED • TULSA 1, OKLAHOMA

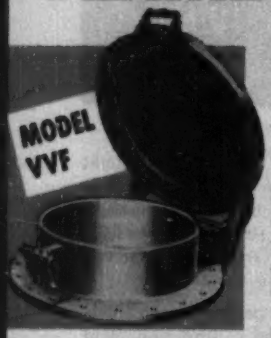
DOWELL

A Service Subsidiary of
THE DOW CHEMICAL COMPANY

Here's a product that—

- Gives positive pressure relief!
- Saves vapor loss!
- Protects against fire!

BS&B COMBINATION VENT VALVE FLAME ARRESTER



Has all the features of Model VVFA, except arrester bank. Can be a secondary relief valve with higher setting, or primary relief valve on non-flammable materials.

Patented Cantilever-Type Arrangement of rubber to metal seating makes for high vapor conservation...gives a tight seal in a hurry to cut off oxygen supply and extinguish flame. And this snuffing action is automatic!

Safe, Positive Protection to storage tanks containing flammable material is assured, thanks to exclusive BS&B design. And the high efficiency Vent Valve Flame Arrester has excellent flow characteristics!

Cleaning is Simple, since valve bonnet can be left on when taking out arrester bank. Valve stays in service during time arrester is being cleaned. Remember, with Vent Valve Flame Arresters maintenance time is cut in half, cost is cut even lower. Let us tell you how BS&B Vent Valve Flame Arresters may give you a more efficient, economical operation . . . with greater safety!

This bulletin tells the complete story. Write for it today!

Your Free Copy of Bulletin E-601 will tell you the seventeen outstanding features that make BS&B Vent Valve Flame Arresters your best buy. Or, ask your BS&B man to study your particular requirements. There's no charge, no obligation.

SAFETY BS&B HEADS OUR 60TH YEAR

BLACK, SIVALLS & BRYSON, INC.
Safety Head Division, Dept. 2-N7
7500 East 12th Street Kansas City 26, Missouri

mote station selector is installed at the junction of the local field tank lines. A single telegraphic circuit connects the station selector to the remote gaging station.

At the remote gaging station the operator selects the tank to be gaged by turning the tank selector knob. When the control key is depressed the tank selection impulse is automatically transmitted over the single telegraphic circuit to the remote station selector unit located at the tank farm. This selector then automatically connects through to the desired tank and triggers the tank transmitter into action.

Each tank is identified by a code number. This code identification is transmitted together with the level information and is shown on a separate gage at the gaging station. Thus the operator has positive assurance that he is receiving information from the correct tank.

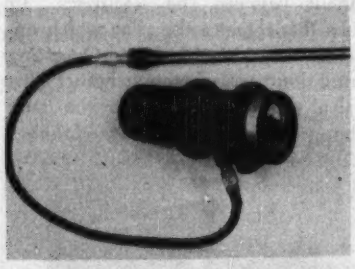
Cost of the system appears very favorable. A system to deliver gaging information from 12 tanks to an office 50 miles away over an existing private wire would cost approximately $7,500. A selsyn system, which is only effective within a two mile range, would have about the same cost exclusive of wire. Addition of wire costs for the selsyn system makes it considerably more expensive than the Varioplex system.—*Shand and Jurs Co., 8th and Carlton Streets, Berkley, Calif.*

Flowmeter Performs Several Functions

A New Flo-Watch Model AFUAQ for metering flow of liquids, steam, air and gas is adaptable for any combination of totalizing, indicating or recording functions. Flow is measured through standard differential producers such as venturi tubes, nozzles, and orifices. Also, the unit is designed for use with Kennison open nozzles, flumes and weirs.

A totalizing model with transmitter attachment can actuate a secondary instrument or pace a chemical feeder remotely located. A summation meter also may be operated from simple transmitting attachments in several individual Flo-Watch instruments. Totalizer readings are given directly in quantity units such as gallons or cubic feet. Indicator scale and chart graduations are carefully arranged to provide maximum readability through-

out the measuring range from 25 to 100 percent of full scale.—*Builders-Providence, Inc., 345 Harris Ave., Providence, R. I.*



Non-Conductor Levels Controlled by Electronics **A**

Level control for non-conductive materials ranging from condensed gases to semi-solids is provided by a new electronic unit. Precise level control is secured, particularly in the high temperature and high pressure ranges.

All components except the sensing probe are contained in a compact sealed housing. Exchangeable sealed component units are available for insertion into the control housing. The custom built probes are built of corrosion resistant material. For explosion-proof installation the Ktrol is furnished with an oil-filled housing.—*Greylor Co., 605 West Washington Blvd., Chicago 6, Ill.*

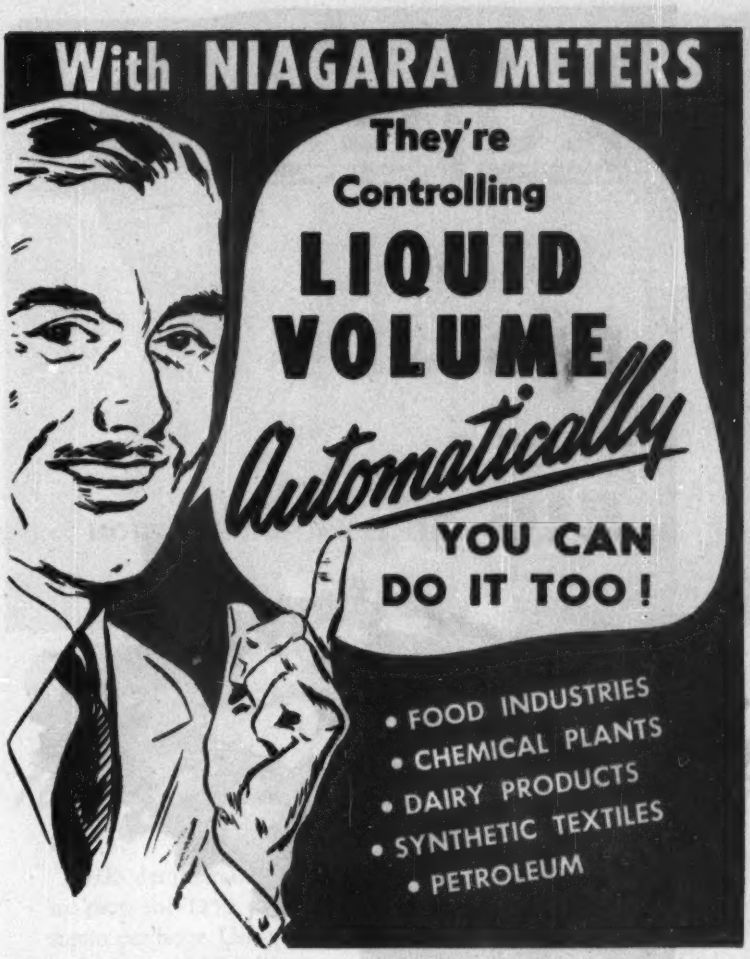
Portable Instrument Spots Static Charges **B**

Type D electrostatic locator is a portable instrument for detecting electrostatic charges and electrostatic induction. It also provides an indication of the amount of electrical charge on moving or stationary equipment or materials.

Weighing less than 4 lb., the unit contains its own source of power. Full sensitivity is employed for general area inspection. Provision for reduction of sensitivity permits close examination of a charged area without sending the meter needle off scale. Parts of the instrument most likely to be affected by moisture and dirt are sealed to assure trouble-free life.—*Specialties, Inc., Skunks Misery Rd., Syosset, L. I., N. Y.*

Liquid Level Controlled by Electrodes **C**

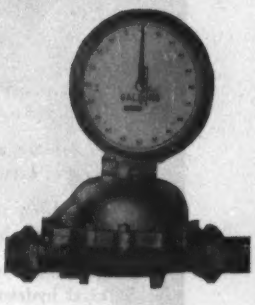
A recently available liquid level control contains only three time-tested standardized components. These are an electrode holder, a relay, and a direct-operated solenoid valve.



Imagine the time and guesswork you can save by measuring liquid volumes automatically. Just set the hand of the NIAGARA Electri-Contact METER at the volume desired and turn on the flow of liquid.

SET IT — FORGET IT

It will turn off automatically. NIAGARA METERS enable your men to handle more work.



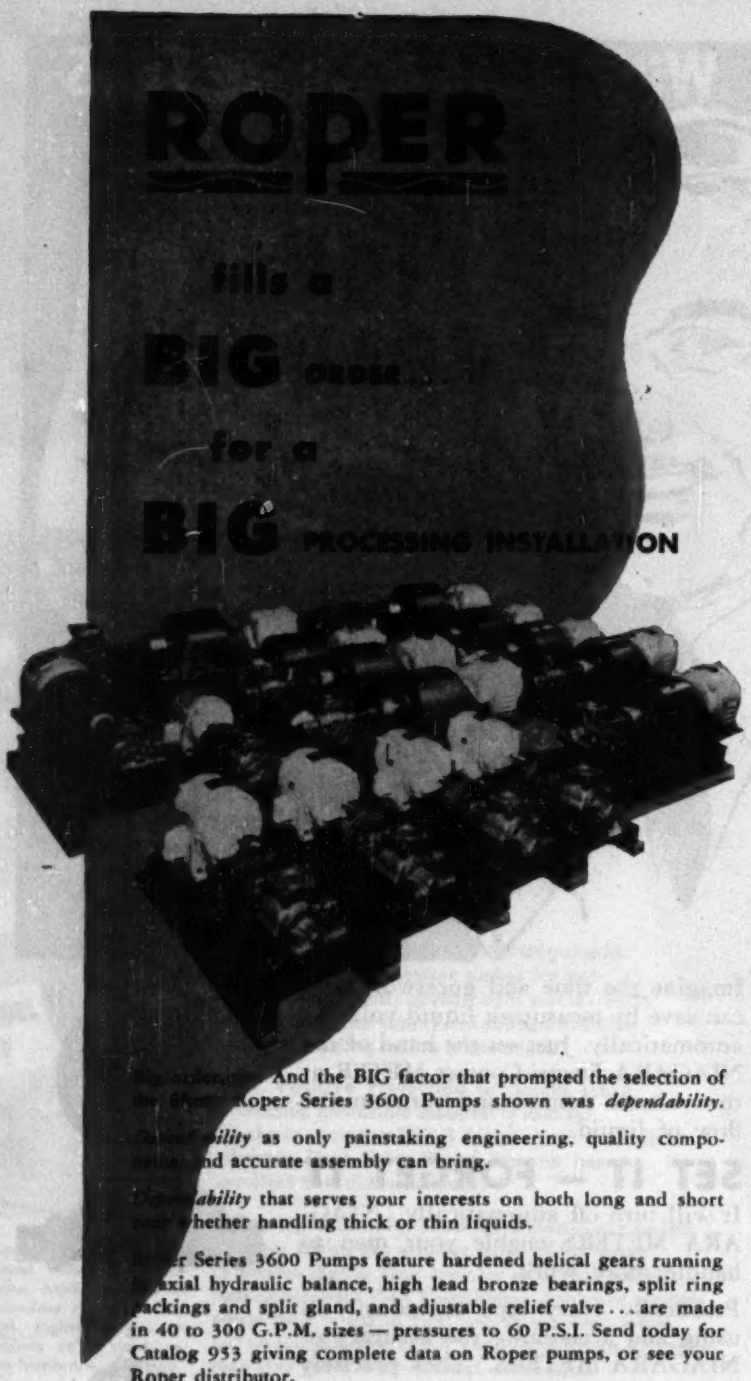
Practically every type of industry is using and acclaiming the accuracy of NIAGARA METERS. They precisely measure liquid volumes from one to one thousand gallons a minute!

There's a NIAGARA METER for nearly every type of liquid including most chemicals. Investigate the advantages of NIAGARA METERS.

Write today for full details.

BUFFALO METER CO.

2891 MAIN STREET • BUFFALO, NEW YORK



...And the BIG factor that prompted the selection of the 8 ... Roper Series 3600 Pumps shown was *dependability*.

...*ility* as only painstaking engineering, quality compo... and accurate assembly can bring.

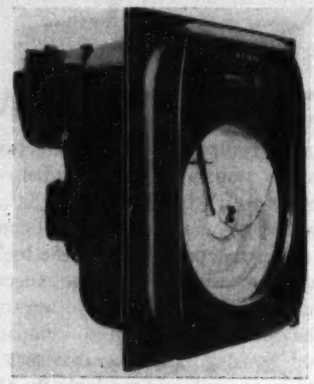
...*ability* that serves your interests on both long and short ... whether handling thick or thin liquids.

...r Series 3600 Pumps feature hardened helical gears running ... axial hydraulic balance, high lead bronze bearings, split ring ...ackings and split gland, and adjustable relief valve . . . are made in 40 to 300 G.P.M. sizes — pressures to 60 P.S.I. Send today for Catalog 953 giving complete data on Roper pumps, or see your Roper distributor.

ROPER
Rotary Pumps

GEO. D. ROPER CORPORATION
437 BLACKHAWK PARK AVENUE, ROCKFORD, ILLINOIS

In operation two stationary electrodes are suspended in the tank. Rise and fall of liquid makes or breaks the circuit between the electrodes. In turn this actuates the relay which operates the solenoid valve. Operating conditions will dictate whether this valve shall be located in the tank supply or discharge line.—*Johnson Corp., Three Rivers, Mich.*



Flow and Level Meter Uses Magnetic Coupling **A**

Linkage between the manometer float and the external metering parts of a new mechanical flow and level meter is through a magnetic coupling. This permits the mercury manometer to be completely sealed eliminating stuffing boxes or pressure-tight seals.

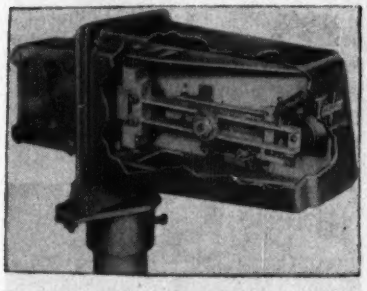
High accuracy of the Magna-Clutch is obtained through the use of a large float, long float travel and the frictionless magnetic linkage. There is no hysteresis even at high static pressures.

Magna-Clutch is produced in recording, integrating, pneumatic transmitting and controlling styles for static pressures to 2,500 psi. Seven interchangeable range tubes cover a range from 20 to 750 in. Hg. For low pressures to 10 in. of water, bell style manometers are furnished.—*Penn Industrial Instrument Corp., 4110 Haverford Ave., Philadelphia 4, Pa.*

Speed Recorder Covers Wide Range **B**

A permanent record of speed is furnished by a new strip chart recorder. Designed for use with the manufacturer's tachometer indicators and heads, the instrument is available in eighteen different speed ranges. Speed can be recorded in any selected units, such as rpm., fpm., cycles per min., yd. per hr., or in. per min.

Recorders are inkless, thus there is no ink to spill, evaporate or blur, and no pen to start or clog. Charts are 4 in. wide, 65 ft. long, and have 50 or 60 minor divisions, depending upon the speed range selected. Chart speeds are available from 1 to 3 in. per hr.—*Metron Instrument Co., 432 Lincoln St., Denver 9, Colo.*



Pressure Transmitter Aids Flow Measurement A

A new force balance transmitter can be used to measure flow of liquid, steam or gas; gage liquid level or specific gravity. Design of the Transaire transmitter facilitates close-coupled differential pressure measurement and transmission. Differential pressure is converted into an equivalent 3 to 15 psi. output.

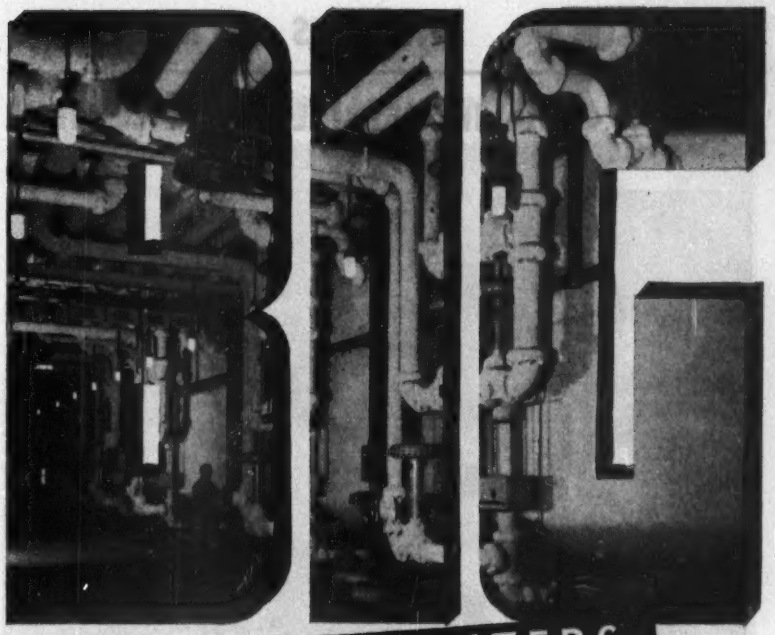
Contained in the transmitter assembly are two basic units. Differential pressure is sensed by the primary unit which consists of a two-part forged steel or stainless steel housing enclosing a Teflon-coated, glass-fabric diaphragm. The inner housing is shaped to the diaphragm contour giving full overload protection of 1,500 psi. on either side of the diaphragm.

Proportional output air pressure is transmitted by the secondary unit which incorporates a ruggedly constructed, pneumatic force-balance transmitting system. This unit is completely enclosed by a gasketed, cast-aluminum cover, self-purged to keep out corrosive vapors and dust.

Continuous range adjustment is provided in one model from 20 to 200 in. and in the other model from 80 to 800 in. of water.—*Taylor Instrument Co., 95 Ames St., Rochester 1, N. Y.*

Indicating Instrument Supplements Viscometer Line B

Viscometer applications where a permanent record is not required and the cost of a recording instrument cannot be justified can now be furnished with a new indicating instrument. Basic measuring elements used



DEMINERALIZERS

USE

Nalcite® (DOWEX*) ION EXCHANGE RESINS

THIS demineralizer, one of the world's largest, provides 100% makeup for 1250 psi boilers generating 1,200,000 pounds of steam per hour. Using Nalco ion exchange resins, Nalcite HCR® and Nalcite SAR, silica is successfully removed from the feedwater — as illustrated by the fact that after 75 to 100 concentrations, silica content of the boiler water is still *less than 5 ppm!*

In demineralizers large or small, Nalcite ion exchange resins give top performance. They are chemically and physically stable for long life at top efficiency. *Two* Nalcite anion exchangers . . . your choice of SAR or SBR . . . are available to meet the conditions of your water supply. Either, used with Nalcite HCR, offers top quality demineralized makeup for high pressure steam generators.

*Reg. Trademark of The Dow Chemical Company.

DATA ON SILICA REMOVAL

A new edition of Nalco Bulletin 57 gives technical data on Nalcite SAR and Nalcite SBR anion exchangers . . . includes complete up-to-the-minute information on silica removal. Write for your copy today.

NATIONAL ALUMINATE CORPORATION
6236 West 66th Place • Chicago 38, Illinois
In Canada: Alchem Limited, Burlington, Ontario

Nalco®

PRODUCTS • *When you use Nalcite resins, you take advantage of Nalco's long and broad experience in water and process technology.*

SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL

Soy Bean Mill. Two large double file Sly Dust Filters handling soy bean meal dust.

SOY BEAN PLANT SAVES $400 PER DAY Through DUST RECOVERY

Because of the meal dust created in processing soy beans, this company* included Sly Dust Filters, as standard equipment five years ago, in its original layout.

The Sly Filters collect 5½ tons of soy bean meal *daily*, at a value of upwards of $400. Not only is the company highly pleased with these savings but also with the resulting cleanliness of its plant. Filter maintenance has been insignificant.

In crushing, shredding, pulverizing, loading, packaging, operations—in various process industries—dust is created. If valuable, the dust can be reclaimed profitably. Even if the dust has no value its collection pays off in cleaner plants, better working conditions and reduced costs.

Expertly designed and built, Sly Dust Filters offer many advantages in greater filtering capacity, easier bag replacement, automatic control, and other features which spell low cost operation.

MAY WE TELL YOU MORE ABOUT SLY FOR YOUR PARTICULAR APPLICATION?

*Name upon request.

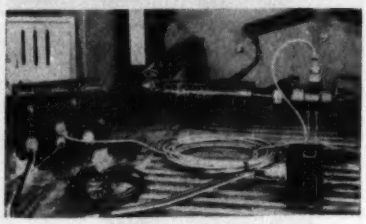
THE W. W. SLY MANUFACTURING CO.

4771 TRAIN AVENUE • CLEVELAND 2, OHIO

New York • Chicago • Philadelphia • Syracuse • Detroit • Buffalo
Cincinnati • St. Louis • Minneapolis • Birmingham • Los Angeles • Toronto

with the indicator give viscosity determinations based on the time required for a piston to fall a given distance through the solution being measured.

Designed for either panel or wall mounting the indicator has a six in. dial. It can be supplied as an indicator-controller for some automatic control applications. The indicator can be located any reasonable distance from the measuring element.—*Norcross Corp., Dept. N 13, Newton 58, Mass.*



New Meter Measures Mass Flow

A

One of the commonest calculations performed by chemical engineers is the conversion of volumetric flow rate into mass flow rate using separately determined volumetric rate and density values.

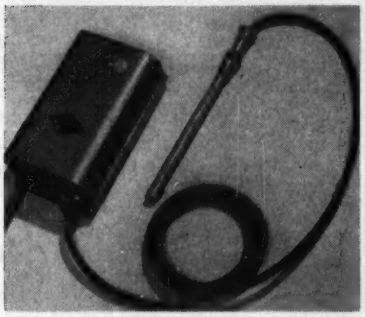
This entire operation is now performed automatically and continuously by the Gavco gravimetric flow measurement system. A volumetric flow sensing element and a density sensing element feed separate electrical signals to an electronic compensator and integrator. Output from the integrator gives a direct mass flow reading on the face of a dial indicator.

Accuracy of the volume sensing element is 0.5 percent; the density detector measures variations within 1 percent. Pressure drop is less than 1 psi. at 20,000 lb. per hr. throughput.

Possible applications are continuous automatic control of mass flow ratios into reaction units, filtration operations, extraction processes and blending operations. In particular where temperature changes exist with resultant density changes this device will continue to give true mass flow rates.

Individual elements of the meter are unit designed. Thus density detector and compensator, volume sensing element and integrator, and indicator drive can be used independently, in conjunction with each other

or with standard recording, control and indicating instruments. Component parts of one complete gravimetric measuring instrument weigh less than 8 lb.—*Gavco Corp., 540 East 80th St., New York 21, N. Y.*



Level Control Covers Wide Limits **A**

Based on the capacitive action of liquid surrounding a porcelain enamel-covered electrode, the new Belmont level control provides liquid level adjustments and cut-in cut-out differential over very wide limits.

In operation the new unit consists of the probe, a connecting cable and control unit. Length of the connecting cable can vary up to 1,000 ft. The two main controls (liquid level and differential) are designed for screwdriver adjustments. A vernier or fine control on liquid level is operated by a panel front knob.

Standard models operate from 115 volts, 60 cycle supply. Special units are available for a 230 volt or 25 cycle operation.—*Thermo Instruments Co., 1166 El Camino Real, Belmont, Calif.*

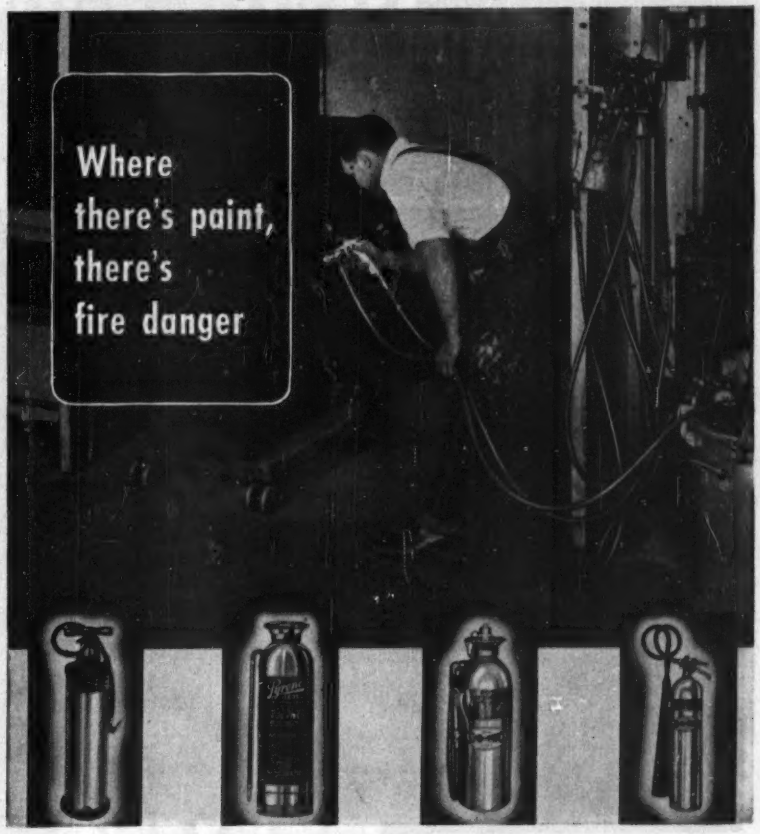
Scale of Gas Flow Meter Is Protected From Dirt **B**

A new line of flow meters for air and industrial gases features built-in calibration for the specific gas and rate of flow to be measured. Only moving part in the meter is the float assembly which rises and falls within a tapered metering tube.

A float, float rod and indicator make up the float assembly. Float and indicator are mounted on opposite ends of the float rod. Directly below the metering tube is a separate transparent indicator tube. When the float is at the bottom of the metering tube the end of the float rod carrying the indicator extends down to the bottom of the indicator tube.

Oil fills the indicator tube serving as a pulsation dampener. Presence of

There's a Pyrene for every fire hazard



These extinguishers are for paint fire hazards: Pyrene Vaporizing Liquid Pressure and Foam Types; C-O-Two Dry Chemical and Carbon Dioxide Types.

don't be caught fidgeting while your plant burns!

There's one right time to buy fire protection equipment. That's *in time!* Don't delay. Play safe—and don't skimp. Buy enough of the best and make sure it's handy to all of your hazards. Your local Pyrene distributor has the right Pyrene* equipment to cope with any fire hazard you may have—everything from hand extinguishers to automatic systems. He also carries Pyrene parts and recharges. One call to him, one purchase order, one invoice will take care of any need you may have. Write us for his address.

*T.M. Reg. U.S. Pat. Off.

Portable fire extinguishers: vaporizing liquid, soda-acid, foam, cartridge-operated, carbon dioxide, dry chemical, and pump tanks • **Wheeled extinguishers:** soda-acid, foam, carbon dioxide, dry chemical types • **Air foam play pipes** • **Systems** for special hazards

Pyrene FIRE EXTINGUISHERS

PYRENE MANUFACTURING COMPANY
593 Belmont Ave. Newark 8, New Jersey
Affiliated with C-O-Two Fire Equipment Co.

Where Life itself depends on accurate Speed Control!

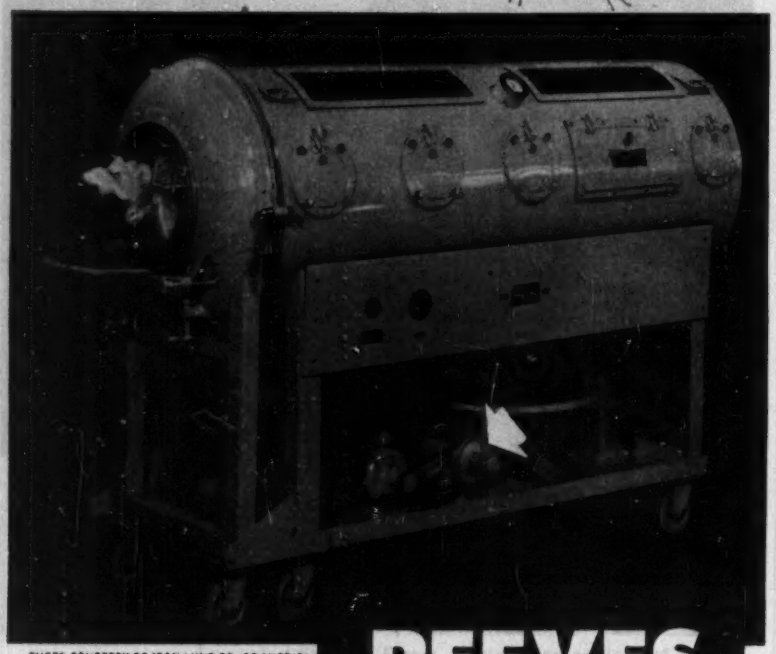
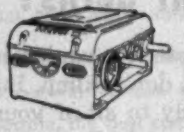


PHOTO COURTESY OF IRON LUNG CO. OF AMERICA

REEVES is on the job

Choose from the Complete REEVES Line

Variable Speed Transmission: provides speed flexibility over 2:1 to 16:1 range. Fractional to 87 hp. Heavy duty applications.



Vari-Speed Motor Pulley: converts any constant speed motor to a variable speed drive. 4:1 speed ratio. Sizes to 10 hp.

Motodrive: combines motor, speed varying mechanism and reduction gears in one unit. 2:1 to 6:1 speed ratios. Fractional to 25 hp.

Flexi-Speed Drive: versatile, economical drive with 8:1 speed range. Mounts in any position . . . drives in any direction. ½, ¾ and 1 hp.

When a polio victim depends on the Iron Lung for his very breath—his chest expanding and contracting automatically to the positive and negative pressures inside the Lung—REEVES Speed Control regulates his breathing. Simply by the turn of a handwheel control, the technician varies the rate of respiration to suit the exact breathing requirements for each patient and each changing condition. This is only one of the more than 2,750 leading makes of machines standardly equipped with REEVES Speed Control for outstanding dependability and performance. When you buy *new machines* insist on REEVES-equipped. Give your machines *now in service* greater work range, increased output, greater accuracy by installing REEVES Speed Control. Write today for 132-page catalog. Specify Dept. CE99-G.

REEVES PULLEY COMPANY • Columbus, Indiana

the oil prevents dirt or foreign matter present in industrial gases from accumulating on the inside of the tube.

Eleven different sizes of meters cover a range from 0-10 to 0-1,500 cfm. Meters can be either panel or bracket mounted. A red tab marking gives the name of the gas for which the meter is calibrated. This eliminates confusion as long as the meter is in use.—*Waukee Engineering Co., 759 No. Milwaukee St., Milwaukee 2, Wis.*

Can Operate Plant Giant Computer

A major stride toward completely automatic control of industrial processes has been unveiled with announcement of ERA 1103 general purpose electronic digital computing system. It is said the new computer will make possible automatic processing in large oil refineries and chemical plants.

Processing data will be received by the machine through sensing devices at various stages of the operation. This data would be processed in the computer in accordance with instructions previously fed in, governing such things as temperature, pressure, time and mixture.

If desired, the computer can receive data based on the analysis of the crude oil being processed. In turn, the process will be regulated so that the refinery will produce the highest dollar volume obtainable. Complete control of the plant can be geared to producing optimum refinery output with shifting economic and industrial processing conditions.

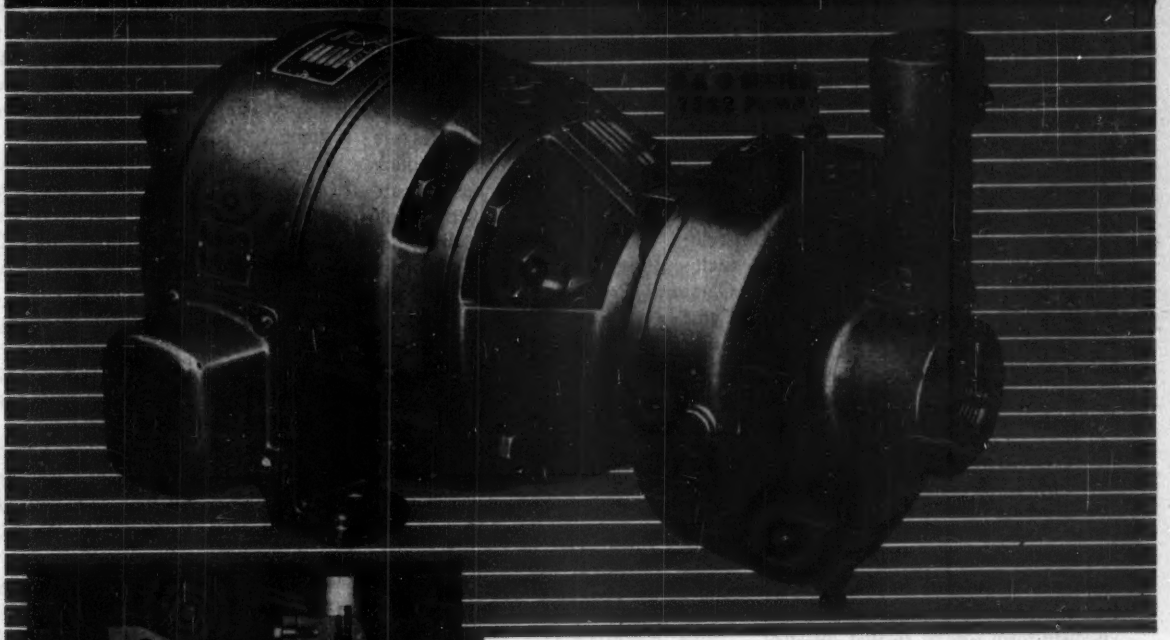
Actual calculations of addition, multiplication and division are made with lightning-fast speed. The computer memory is composed of electrostatic, magnetic drum and magnetic tape facilities. These devices store the data while control circuits handle the routing of information within the computer during solution of the problem.

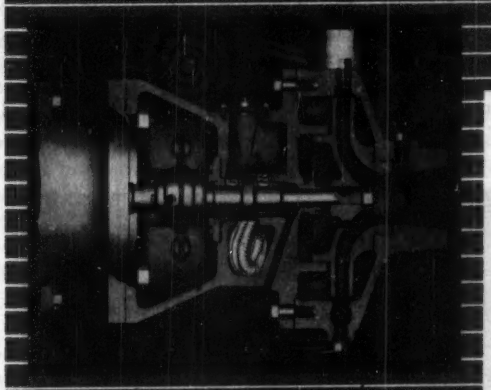
Cabinets of advanced modern design house the computer system on an area slightly smaller than the ground floor of an average house. Total weight is 10 tons. Although 4,500 electron tubes are used in the circuits power consumption is less than that of four double-oven electric ranges.—*Remington-Rand, Inc., 315 Fourth Ave., New York 10, N. Y.*

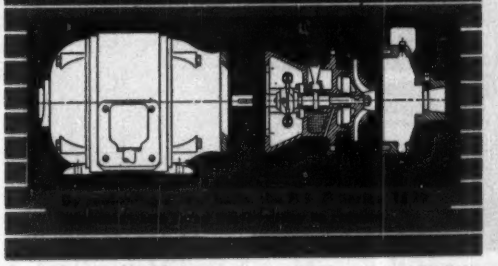
—*End*

Worth looking into...

SEE THE 8 REASONS WHY B & G SERIES 1522 PUMP DOES A BETTER JOB







When you check into these design features, it's easy to understand why B & G Series 1522 Pumps are making performance records...

First: Leak-proof Mechanical Seal—ends stuffing box troubles.

Second: Spring-type flexible coupling—contributes to unusually quiet operation.

Third: Dynamically balanced impeller.

Fourth: Easily serviced. Removal of a few bolts permits separation into three parts.

Fifth: Interchangeable parts. The bearing bracket sub-assembly, including shaft and sleeve bearings, is manufactured to close tolerances and is interchangeable in all B & G 1522 Pumps.

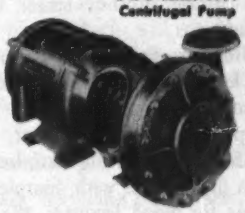
Sixth: Shaft alignment maintained by oil-lubricated, high grade bronze sleeve bearings.

Seventh: Standard motors—easily obtainable from motor manufacturer's stocks.

Eighth: With all these features, B & G Pumps are *competitively priced!*

Don't delay—get the facts *now* on B & G Centrifugal Pumps.

B & G Series 1531 Centrifugal Pump



B & G Series 1510-15 Centrifugal Pump

Send today for catalogs giving descriptions and selection data for B & G Centrifugal Pumps.

Heat Exchangers . . . Water Heaters
Pumps . . . Refrigeration Equipment
Forced Hot Water Heating Systems

BELL & GOSSETT

COMPANY

Dept. DA-14, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto

Product News

Edited by Frances Arne

Cellulose Polymer (A)

Low-viscosity form to compete with nitrocellulose in the finishing field.

The process for manufacturing cellulose acetate butyrate has not readily lent itself to the production of a low viscosity form similar to that supplied to the finishing industry by nitrate manufacturers. Early this year, however, Tennessee Eastman Co. cracked the production problems at its plant in Kingsport, Tenn., and a low viscosity half-second butyrate was handed to the development chemists. According to their evaluation, the half-second butyrate produces exceptional metal lacquers. Such lacquers, it was claimed, exhibit considerably greater resistance to weathering than nitrate lacquers and retain their initially low color much longer. They neither whiten during underwater immersion tests, as do most varnishes, nor blister or peel as do nitrate finishes under the same conditions.

Butyrate finishes were shown to be far less flammable than nitrate finishes. Also, unlike nitrate which must be shipped wet with solvent, the raw half-second butyrate can be handled as a dry powder with complete safety.

As for wood lacquers, the butyrate is said to afford a higher degree of protection against ultraviolet light than nitrate lacquers. Also it withstands ten "cold check" cycles, demonstrating at least a partial solution to furniture manufacturers' age-old problem of surface checking brought about by rapid temperature changes.

As a paper lacquer, the new polymer is said to provide tough, transparent coatings highly resistant to grease, water and lipstick. Also mentioned among its potential fields of application: lacquers for various plastics including acrylics, cellophane, phenolics and polystyrene; peelable plastic coatings for the packaging industry; heat sealing adhesive coatings and hot melt coating compositions.—*Eastman Chemical Products, Inc., Kingsport, Tenn.*

Neoprene Coatings (B)

New system of anti-corrosion coating said to save 50 percent per sq. ft. in maintenance painting.

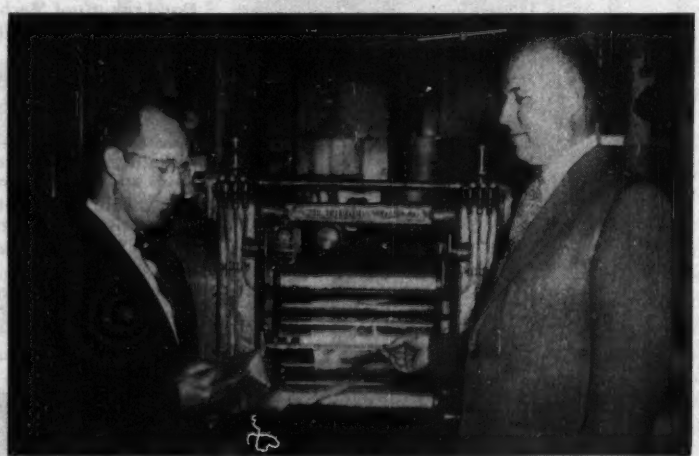
After three years of testing under severe corrosion conditions in its own plants, Pennsalt has introduced a new system of anti-corrosion coating using specially formulated neoprene coatings.

In a number of cases, it was reported, the over-all initial cost of using the new system appeared to be higher than other methods. But measured against maintenance painting costs over several years, the new system was about half that of other systems.

The special formulations added to Pennsalt's regular line of corrosion resistant paints and cements are NeoCoat and NeoPrime A (for all surfaces except concrete) and NeoPrime B (for concrete surfaces).

NeoCoat is a true plastic, involving polymerization, in which the accelerator is included in the product. The polymerization takes place after the coating is applied.

In Pennsalt's tests it was found that to stand up in service, a coating had to be built up to a thickness of at least 5 mils, regardless of its corrosion resistance, and had to be especially effective in covering welds, beads, seams and edges where coatings most frequently failed. It was also found that it is uneconomical, from the labor and time standpoint,



PLASTICIZER HERALDS NEW CLASS OF MODIFIERS (C)

A new process for epoxidation, hydroxylation of fats is responsible for two low cost vinyl plasticizers recently announced by Baker Castor Oil. Technical director Don Bolley, right, nursed Baker's modification of a USDA process (*Chem. Eng.*, June '53, p. 110); chemical development director M. Kent Smith, left, headed application research. The first two products to emerge from the collaboration are Estinox 203, a butyl hydroxy-acetoxy ester and Estinox 206, a butyl polyacetoxy ester used in the vinyl sheeting shown above. Not only has Baker a whole line of hydroxylated fats in the offing, but other companies like Archer-Daniels-Midland (see p. 229) are busy exploiting their own versions of the USDA process—Baker Castor Oil Co., 120 Broadway, New York, N. Y.

to apply more than three coats, including the primer. Therefore, Neo-Prime and NeoCoat were formulated to attain the proper thickness within three coats.—*Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.*

IN BRIEF—A capsulated listing of this month's newsworthy products

It's New . . .	It's Good for . . .	See Page . . .
Cellulose Polymer	Competing with nitrocellulose for finishes	228
Neoprene Coatings	Saving about 60 percent on maintenance costs	228
Plasticizers	Low cost modifiers for vinyls	228
Dispersing Agent	Controlling efflorescences of latex paint surfaces	229
Vinyl Plasticizer	Promoting heat and light resistance	229
Protective Coating	Inhibiting moisture corrosion in home oil tanks	229
Concrete Substitute	Light, strong roofing or wall slabs	229
Weld-Backing	Promoting uniform weld penetration	229
High Boiling Solvents	Penetrating agents in herbicides, perfumes	230
Soil Conditioner	Preventing erosion on rights-of-way	230
Animal Feed Supplement	Easing formulation for large-volume processing	230
Dispersing Agent	Adding strength to latex paints	232
Sizing Agent	Use in paper under alkaline conditions	232
Insecticide	Broad spectrum use of home gardeners	234
Dyestuff	Excellent fastness, bleaching and fulling resistance	234
Naphthalene Derivatives	Research and experimental purposes	234

Dispersing Agent (A)

Helps control efflorescence of latex paint surfaces.

Production of the first dispersing agent available as the potassium salt in powder form and specifically adapted to needs of the latex paint industry, has been announced by Dewey and Almy Chemical Company.

Purpose of Daxad 11KLS, which has very low sodium and sulphate ion content, is to help control the efflorescence occurring on the surface of latex paints, particularly when applied to plaster. It eliminates the necessity for using dispersing agents in the form of sodium salts.

Daxad 11KLS reportedly helps control efflorescence by reducing elements in the paint which contribute to the problem. Research by latex paint manufacturers shows that efflorescent is caused by the action of sodium and sulphate ions normally found both in plaster and latex paint. Hence, if sodium and sulphate salts in the paint are kept to a minimum, efflorescence will be reduced.

Sodium content of Daxad 11KLS is held to a maximum of 0.25 percent and sodium sulphate has been eliminated. Any sulphate present is potassium sulphate and is limited to a maximum of 10 per cent.—*Dewey and Almy Chemical Co., Cambridge, Mass.*

Vinyl Plasticizer (B)

Heat and light resistant product for flexible sheet and film.

Archer-Daniels-Midland Co., Minneapolis, has introduced a new polymeric type vinyl plasticizer. Under development for three years, the new product is an epoxydized soybean derivative.

Although production is licensed under a USDA patent, processing techniques have been improved and perfected by the ADM Research staff which includes pilot processing.

The new plasticizer is reported to have the following features: non-volatility; low extractability; excellent mill behavior; very good low-temperature flexibility; excellent ultra-violet light resistance; excellent heat resistance; low viscosity; outstanding stabilizing properties; economically priced.

In addition, it is odorless and light colored. Pilot plant samples are available now for evaluation work.

The new plasticizer is recommended for use in flexible sheeting, flexible film, plastisol and organisol dispersions, molding and extrusion compounds. A few of the consumer and industrial products manufactured from these materials are: floor coverings, protective coatings, wire and cable coatings and tubing.—*Archer-Daniels-Midland Co., 600 Roanoke Bldg., Minneapolis 2, Minn.*

Protective Coating (C)

Inhibits corrosion caused by moisture in home heating oil tanks.

A new chemical formulation called Sonitor is said to double the life expectancy of home heating oil tanks. Laboratory tests and field trials in over 50,000 home oil tanks are behind the manufacturer's claim that it retards corrosion which causes tank leakage and failure.

It is a crystalline substance, packaged in small cans. The contents of a can are poured directly into the fuel oil tank.

Sonitor settles to the bottom of the tank and mixes with the moisture that always collects there. It is said to prevent the moisture from attacking the metal and to react with the metal to form a protective coating on its surface. Since Sonitor is not soluble in oil, it cannot be dissolved by the fuel and be carried away through the outlet pipe.—*Shell Oil Co., 50 West 50th St., New York 20, N. Y.*

Concrete Substitute (D)

Light, strong building material to be made in U. S.

A new mineral material, now available in the U. S., can be made into roofing slabs, blocks, wall slabs or beams. Density, size and shape can be varied to meet different needs.

Called Zeprex, it weighs about a fifth as much as concrete but can be produced in densities from 25 to 50 lb. per cu. ft. It is fireproof, rotproof and mildewproof.

Zeprex, developed in Sweden, is being introduced to the U. S. by U. S. Plywood Corp.

International Siporex Co., Ltd., holds the patents. Plants make it now in Sweden, Germany, France, Poland, Denmark, Norway and Finland. U. S. Plywood has obtained exclusive rights for U. S. manufacture.

The company will make Zeprex at National Brick Co., Long Island City, a new U. S. Plywood division. U.S.P. has allotted $2-million for construction of a new plant which will be built from Zeprex imported from Sweden. —*U. S. Plywood Corp., 55 West 44th St., New York 36, N. Y.*

Weld-Backing (E)

Silicone "bouncing putty" settles down to work.

The famous G-E silicone material, which can be pulled like taffy or bounced like a ball, is being thinned to a fluid paste and marketed as a weld-backing compound by the com-

pany's welding department at Fitchburg, Mass. Painted on joints before welding, the product is said to promote uniform weld penetration and to eliminate the harmful effects of air on the underside of welds. It is suggested for use in all arc welding processes except automatic inert-arc welding where argon is used as the shielding gas.

General Electric says the new compound overcomes many of the disadvantages of fluxes, metal and gas backing media. It is easily applied to complex parts and the powder residue left after welding can be quickly removed with a cloth. Because it promotes no carbon pickup in the weld, it is very useful in the welding of low-carbon stainless steels. The compound gives off no noxious fumes, and is nonexplosive.

One 16-oz. can of the paste covers 1,300 lineal ft. of joint when applied in a strip ½ in. wide.—*General Electric Co., Pittsfield, Mass.*

High Boiling Solvents (A)

Relative freedom from odor and toxicity mark two new chemicals.

Phenylcyclohexane and bicyclohexyl are commercially available for suggested uses as high boiling solvents, compatibilizing and penetrating agents and in herbicide and perfume formulations.

Phenylcyclohexane is a product of hydrogenation of biphenyl under proper conditions to saturate one of the benzene rings. Therefore, it possesses the properties of both aromatic and aliphatic nature. It is a high boiling, colorless, oily liquid, free from objectionable odor, relatively free from toxicity. And it possesses good electrical resistance.

Interesting derivatives can be made from it via sulfonation, nitration, halogenation and condensation with reactive chemical agents. Phenylcyclohexane is not soluble in water, but is miscible at 25 deg. C. with many solvents and oils such as acetone, benzene, glycerine and hexane.

Bicyclohexyl is a product of the hydrogenation of biphenyl under proper conditions to saturate both aromatic rings. The material is a colorless oil possessing a pleasant odor. It is relatively nontoxic to higher animals.—*Monsanto Chemical Co., St. Louis 4, Mo.*

Soil Conditioner (B)

Mobile spray unit applies new conditioner, seed and fertilizer to stop erosion on rights-of-way.

To be sold under the trade name Bondite, a new soil conditioner has been designed to stabilize aggregates on the soil surface to hold the seed and soil in place until vegetative cover crops germinate and become established. It is meant to control rain and wind erosion on construction sites, levees, rights-of-way and similar applications.

Bondite comes in a number of formulations: (1) hydrolyzed polyacrylonitrile—formulations 9, 931-E and 991; (2) modified vinyl acetate maleic acid—formulations 6 and 631.

According to the manufacturer, tests of more than a year's duration in 21 states and under a variety of soil and weather conditions show that the conditioner is ordinarily effective at the rate of one pound per 100 sq. ft., or 436 lb. per acre. Half this rate has proved effective under some conditions. It may be applied as a powder or as a water solution.

There are limitations in the kind of soil and in the steepness and length of slope on which Bondite is effective. The degree of slope should be about 2:1 or flatter and the length of the slope should be 50 ft. or less. Under ideal conditions good performance may be obtained even though these general limitations are exceeded.

The product has advantages over surface mulches used in erosion control. It is easier to apply, not flammable and will resist wind. In addition, it is available in areas where mulches are not readily obtainable and costs less to transport and store as well as to apply.

For best results the conditioner should be used in conjunction with seeding operations during the most favorable months of the spring and fall planting seasons. Because the conditioner is not a fertilizer, sufficient nutrients should be available in the soil to nourish the vegetative cover being developed. These can be applied simultaneously.

For treating small areas an effective method is to apply Bondite in dry powder form followed by a wetting down. To treat large areas, equipment and techniques have been developed to apply the conditioner in solution form.

Mobile spray units (see cut), for example, have been developed during the last few years by highway departments and contractors for seeding and fertilizing large expanses of the highway roadsides in a single operation. The equipment requires two operators and consists of a large mixing tank with agitation system, large pump, flush tank and special piping arrangement mounted on the bed of a truck.

The seed, fertilizer and Bondite soil conditioner are mixed together in the large tank of water and then sprayed on the soil from the moving truck. —*Monsanto Chemical Co., Organic Chemicals Div., St. Louis, 1, Mo.*

Feed Supplement (C)

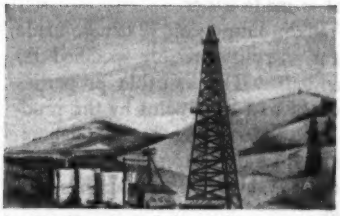
B12 concentrate eases formulation for large-volume processors.

Heyden Chemical Corp. has begun commercial production of a new B12 feed supplement concentrate, under the trademark Pro-Gro-B.

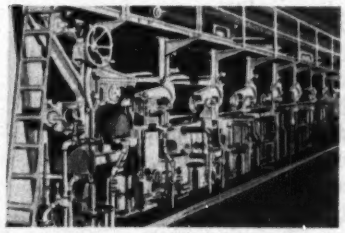
A primary fermentation product of high stability and potency, the concentrate has been designed to be used with Heyden's Pro-Gro, an antibiotic feed supplement in concentrated form. These two essential types of feed supplements, B12 and procaine penicillin G, in concentrated form should make possible more economic formulation, particularly by large volume processors of feedstuffs. Inventory storage space is reduced substantially and savings in shipping costs are made by purchase of diluents available to the blender in his own geographical area.

Pro-Gro-B is stable and compatible with other feed components such as vitamins and minerals which the blender may plan to use in addition to Crystalline Procaine Penicillin G. Heyden's new concentrate is designed

CELITE FILTRATION controls water purity— removes *all* suspended solids



In oil wells—output is boosted by repressurizing wells with water to force out accumulated oil. Celite Filtration purifies water to the extreme degree required—removes the minute suspended impurities which would otherwise clog the microscopic pores of sandstone.



In paper plants—Celite Filtration is used to purify the large quantities of water used in paper formation. Waste water may be filtered for reuse by the same process. Celite filter cakes can withstand many times the pressure of an ordinary filter bed. No pH control is necessary with Celite. *T.M. Reg. U.S. Pat. Off.

CELITE* FILTRATION provides the *right degree* of purity that you require for industrial process water. It removes sediment which may cause costly downtime or damage to expensive plant equipment. And if your application requires greater purity, Celite removes even such fine suspended solids as amoebae and algae, many of which cannot be filtered out by other methods. Moreover, fast, economical rates of flow can be maintained with Celite Filtration

This selectivity in degree of water purity is made possible because Celite comes in nine standard grades . . . each designed to filter out impurities of specific size and type. Carefully processed from the purest deposits of diatomaceous earth, Celite always has utmost uniformity of product. Whenever you reorder, you are assured of the same accurately graded powder.

Celite Filtration offers many other advantages, too. Important space savings are achieved in the installation, longer filtration cycles are obtained, and less backwash water is required for cleaning the filters than with ordinary systems.

Celite Filtration provides pure process water for boiler make-up, heat exchangers, circulating water for towers . . . and many other industrial uses. It will pay you to investigate the advantages of Celite for your particular application. To have a Celite engineer study your problem and offer recommendations, simply write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville CELITE FILTER AIDS

Anyone who can measure volume . . . and can cut pipe . . . can install this ready-made fully automatic fire extinguishing system that requires no power source.

It includes Kidde's split-second rate-of-temperature-rise heat detector (the fastest detection known to the fire-fighting industry), Kidde's powerful Multijet nozzle and a 50-pound cylinder of fire-killing carbon dioxide. You even get a monometer tester. Pipe and fittings are optional.

Six Kidde Standard Paks are available for volumes from 800 up to 6,000 cubic feet.

All components of Kidde Standard Paks are the same as those used in Kidde custom-designed installations. The difference is that Kidde has pre-engineered the Paks for small hazards. And the savings on volume distribution are passed on to you!

You just can't beat Kidde Standard Paks for inexpensive night-and-day protection against normal flammable liquid hazards.

Remember, fire won't wait till you're ready. Better write today for full information.

Kidde **Walter Kidde & Company, Inc.**
728 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

as a free flowing product requiring only simple mixing procedures. Pelleting also said to be easy with Pro-Gro-B.—*Heyden Chemical Corp., 342 Madison Ave., New York 17, N. Y.*

Dispersing Agent (A)

To enhance properties of latex paints of the polystyrene and styrene butadiene types.

Franklin Dispersion 52, designed for use with latex paints, is a film former and a protective colloid of high viscosity. As a film former it is said to add to the strength of the paint film. Since it has an affinity for a wide variety of surfaces because of its chemical structure, it increases the adhesion of the paint to most surfaces.

As a protective colloid, Franklin Dispersion 52 is a deterrent for the separation of the various constituents, either by instability or freezing and thawing.

It offers an inexpensive method of raising the viscosity as desired to obtain the brushing, leveling and flow properties needed.

The new product acquires water resistance on aging several weeks in the paint film. Because of its slow acquisition of water resistance, good lapping properties are conferred to the paints. Also the cleaning of brushes and equipment is made easier.

Franklin Dispersion 52 can be made in any viscosity to suit specified requirements. The valuable properties imparted to a latex paint by the product have been proven by both laboratory test and customer approval.—*Franklin Glue Co., Columbus 15, Ohio.*

Sizing Agent (B)

Can be fixed in paper under alkaline conditions.

A new synthetic sizing material called Cyron can be fixed in paper under alkaline conditions. This is significant because all previous sizes required acidic conditions. Furthermore, it is said to reduce curl, an age-old problem to the manufacturers of wall paper and printing papers.

The new size, with which no rosin, wax or alum is required, may be applied to the surfaces of rosin sized papers for added effect. It is easily

Heyden

PENTEK®

Consider PENTEK as the polyol for alkyd resins—old and new. Its dependability and proved performance are based on years of experience in meeting the exacting requirements of the surface coating industries.

• • •

PENTEK is packed in strong multi-wall paper bags, 80 lbs. net—easy to store and convenient to use. Technical facts and samples are mailed promptly on request.

FINE HEYDEN CHEMICALS

HEYDEN CHEMICAL CORPORATION

342 Madison Avenue, New York 17, N.Y.

CHICAGO • PHILADELPHIA • SAN FRANCISCO • DETROIT • PROVIDENCE

Benzaldehyde • Benzoates • Benzyl Chloride • Bromides • Chlorinated Aromatics • Creosotes
Formaldehyde • Formic Acid • Glycerophosphates • Guaiacols • Hexamethylenetetramine • Medicinal Colloids
Methylene Disalicylic Acid • Neomycin • Paraformaldehyde • Parahydroxybenzoates • Penicillin
Pentaerythritols • Propyl Gallate • Resorcinol • Salicylates • Salicylic Acid • Streptomycin

Dispose of mercaptans, aldehydes, organic and hydro-carbon vapors the new Catalytic Combustion way. Safe — Dependable — Complete — Low Cost.
• Write for details today.

Catalytic Combustion CORPORATION
4548 GRAND RIVER
DETROIT 8, MICHIGAN
Fume Incineration for Industry

precision-made to your needs . . .

BENDIX-FRIEZ

thermistors

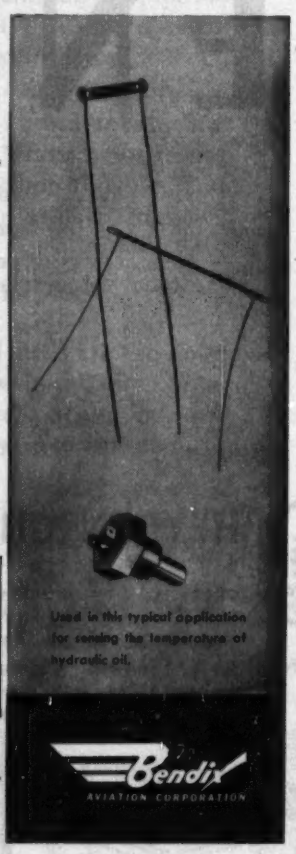
Maybe your need for these temperature responsive resistors can be satisfied by a type we carry in stock. Maybe you require a specially-developed type. In either case you can depend on Bendix-Friez to provide precision-made thermistors to serve you with maximum efficiency. High standards of quality control in manufacture make Bendix-Friez Thermistors pre-eminent in their field . . . assure you of utmost satisfaction.

STANDARD TYPES FOR IMMEDIATE DELIVERY

Size (inches)	@ +30°C.	@ 0°C.	@ −30°C.
.140 x .75	45.0 ohms	86 ohms	194 ohms
.040 x 1.5	12,250 ohms	26,200 ohms	65,340 ohms
.018 x 1.5	35,000 ohms	82,290 ohms	229,600 ohms

Write for details.

FRIEZ INSTRUMENT DIVISION of . .
1418 Taylor Avenue, BALTIMORE 4, MARYLAND
Export Sales: Bendix International Division
72 Fifth Avenue, New York 11, N. Y.



prepared for mill use by dissolving in hot water and adding the solution to the slush stock or to the surface of the paper.

Since paper sized with Cyron is scarcely, or not at all, affected by many alkaline materials, it may be used to wrap moist soap, which causes a condition that can destroy rosin sizing in paper. In addition, the new size can give much better results in wrappers used for cement bags. These are usually filled while the product is hot and this frequently accelerates the degradation of the acidic paper. A neutral paper sized with Cyron can be advantageously used to wrap steel instruments which are highly susceptible to corrosion when wrapped in the normally acidic papers.—*American Cyanamid Co., Paper Chemicals Dept., 30 Rockefeller Plaza, New York 20, N. Y.*

(A) **Malathon,** a new spectrum insecticide, is now available in formulations for home gardeners. Described by the Dept. of Agriculture as one of the safest insecticides to handle, it permits the use of only one spray or dust to control a range of pests including aphids, mites, scales and some beetles and catapillars.—*American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.*

(B) **A new dyestuff** said to distinguish itself by excellent fastness is being introduced by Fabwerke A. G., Hoechst, Germany. The acid dyestuff, Remalanbrillantblau B, is the first of the series to become commercially available. It is said to surpass all known acid blue dyes as far as bleaching and fulling resistance is concerned. Meant for the coloring of loose wool, it is also suited for polyamid fibers as well as certain types of polyacrylonitrile fibers.—*Farbwerke A. G., Hoechst, Germany.*

(C) **New naphthalene derivatives** are now available: alpha-naphthaldehyde, alpha-naphthyl carbinol and alpha-naphthoic acid. Now offered in research and developmental quantities, larger scale production is available whenever the demand arises.—*Raymond C. Crippen Research and Development Laboratories, 1138 East North Ave., Baltimore, Md.* —*End*

Here's a High Purity "Alum" That's NEW and DIFFERENT

B&A Purified HEXAHYDRATE Aluminum Sulfate

$(Al_2SO_4)_3 \cdot 6H_2O$

For Special Uses Where High Assay and Low Water Content Are Desirable

BAKER & ADAMSON DEVELOPED this special new grade of Aluminum Sulfate in *hexahydrate form* to meet the exacting process requirements of a customer who needed "alum" of very low water content and extremely high assay.

This B&A fine chemical is a white, uniform, free-flowing powder of excellent solubility. It contains 22% Al_2O_3 and assays in excess of 93% $(Al_2SO_4)_3 \cdot 6H_2O$, offering a purity equivalent to U.S.P. quality on this higher assay basis. Its superior quality reflects General Chemical's long recognized leadership and experience as a producer of commercial and U.S.P. aluminum sulfate in many plants from coast to coast.

If yours is a special process where you can afford to pay more for raw materials to get higher quality and better performance, you will want to investigate this unusual material. For samples and further information, send coupon today. No obligation, of course.

FINE CHEMICALS B&A STANDARD OF PURITY REAGENTS

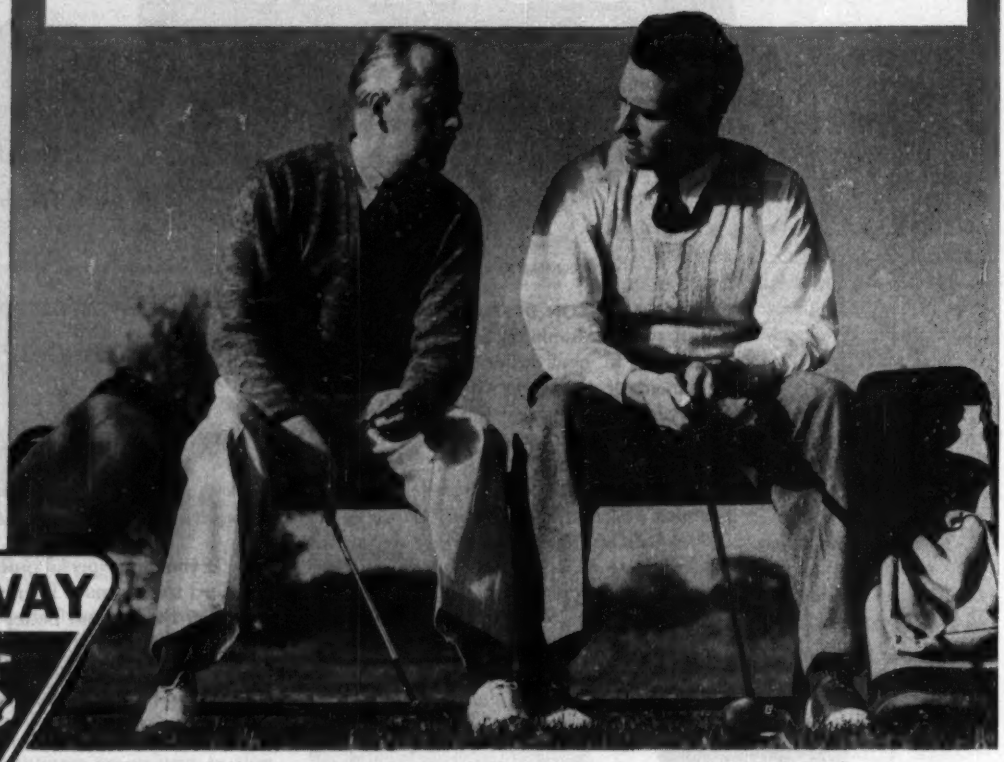
BAKER & ADAMSON
Fine Chemicals
GENERAL CHEMICAL DIVISION
Allied Chemical & Dye Corporation
40 Rector Street, New York 6, N. Y.

Clip this coupon to your company letterhead and mail today!

GENERAL CHEMICAL DIVISION, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y.
Please send me further information on B&A Purified Hexahydrate Aluminum Sulfate.
I would like to receive ☐ Data Sheet ☐ Sample
I am interested in examining this material for the following use:_____
Name_____
Company_____
Address_____ CE-7

"WHERE DO YOU BUY YOUR ALKALIES, BILL?"

"I Call SOLVAY *FIRST* for Alkalies because...



SOLVAY

Soda Ash
Caustic Potash
Chlorine
Potassium Carbonate
Calcium Chloride
Sodium Bicarbonate
Sodium Nitrite
Caustic Soda
Cleaning Compounds
Ammonium Bicarbonate
Para-dichlorobenzene
Ortho-dichlorobenzene
Monochlorobenzene
Ammonium Chloride
Snowflake® Crystals

... I know I can count on Solvay to give me the services I need to operate my business smoothly. Whether I'm placing a big order, or whether I want some technical help, I always get cooperation from the folks at Solvay.

A perfect example of this is Technical Service. Through the years, Solvay has accumulated a vast store of technical information that has been put into informative booklets called Solvay Technical Service Bulletins. These bulletins are available to me whenever I need 'em. And they cost me nothing—they're free. I can also get further technical help from the Solvay Technical Service staff—fellows who are experts in individual industries.

Doing business with Solvay is convenient for me, too . . . there are thirteen sales offices in key cities where you can get courteous friendly service. And you can get prompt delivery from Solvay's three centrally-located plants and more than 200 local stock points.

Why don't you call *Solvay first* for alkalies?"

SOLVAY PROCESS DIVISION

Allied Chemical & Dye Corporation
61 Broadway, New York 6, N. Y.

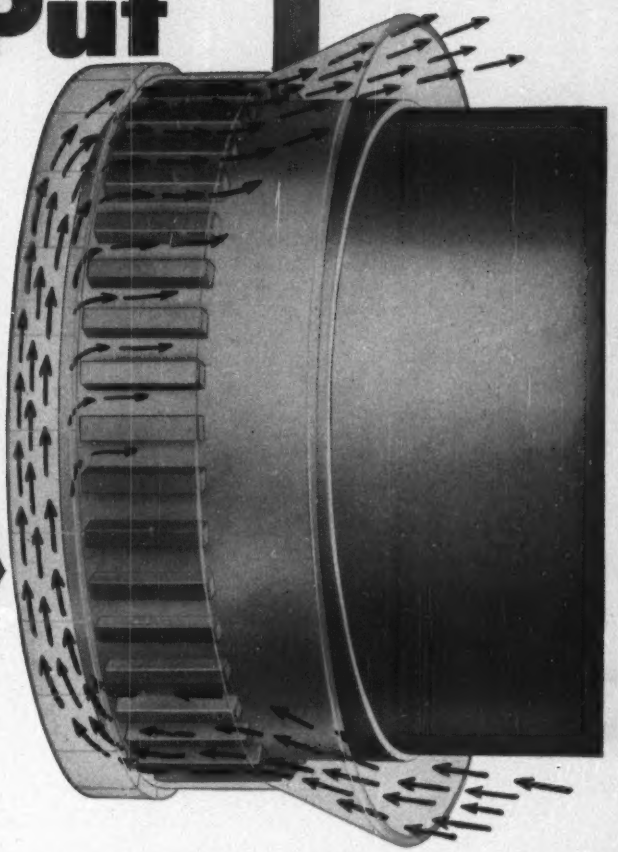
BRANCH SALES OFFICES

Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit
Houston • New Orleans • New York • Philadelphia • Pittsburgh
St. Louis • Syracuse

Nose Brick "Stays Put"

in Rotary Kilns Equipped With

ALLIS-CHALMERS Air-Cooled KILN END



Savings in Refractory Brick Will Pay for Air-Cooled Discharge End in 2 to 3 Years!

No end warpage on rotary kilns equipped with this air-cooled discharge end. Hot end stays cool, round and rigid. No shut-downs to replace end brick. In addition to refractory savings, you'll get . . .

MAINTENANCE SAVINGS . . . No loss of valuable production time to replace end brick! Savings in brick, labor and down-time will pay for air-cooled end *several times over* during life of kiln.

AND FUEL SAVINGS . . . Because the discharge end will not distort, the air seal between the firing hood and the kiln continues to be effective after years of service. Fuel savings result when the temperature of the air inside the kiln is not decreased by infiltering cold air. A-3934

Air-Cooled kiln end can be installed on kilns now in service. Get more facts from the A-C representative in your area, or send for Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wis.

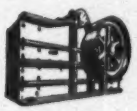
A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Hammermills

Vibrating Screens

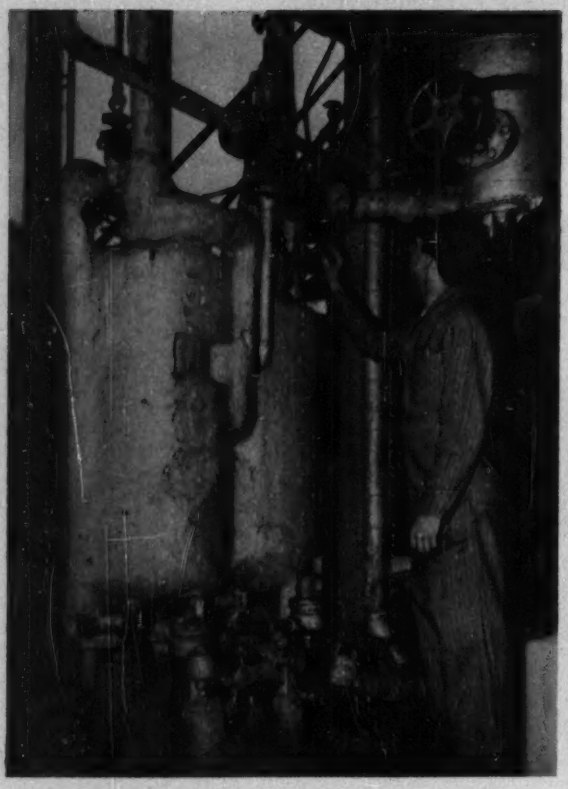


Jaw Crushers

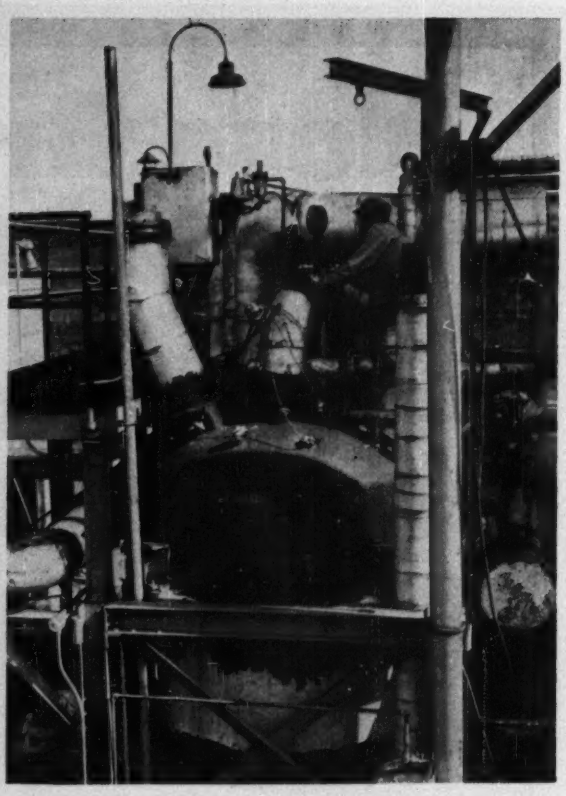
Gyratory Crushers

Grinding Mills

Kilns, Coolers, Dryers



1 Two separate benzene vaporizers prepare weighed charges of benzene for the twin converter.



2 Converter catalytically oxidizes benzene vapors in a highly exothermic reaction. Special cooling is employed.

Maleic Anhydride

A CHEMICAL ENGINEERING PICTURED FLOWSHEET

Synthetic resins are demanding more and more maleic anhydride. Here's how it's made from benzene.

Maleic anhydride is produced by the oxidation of benzene (the method described here), and as a byproduct in the production of phthalic anhydride by the oxidation of naphthalene.

Largest outlet for maleic anhydride is synthetic resins.

The accompanying pictured flowsheet describes the production of maleic anhydride at the Elizabeth, N. J. plant of Reichhold Chemicals, Inc.

Benzene is periodically pumped from storage into a weigh tank from which it is continuously fed into two separate vaporizers. The benzene vapors are then mixed with air and passed through a twin converter unit where they are catalytically oxidized. Vanadium pentoxide is the catalyst. The highly exothermic reaction is maintained at 400-450 deg. C. by efficient heat removal. Special cooling means are employed, such as circulating mercury or fused salts across the tube banks. Pressure is about atmospheric.

Equation for the reaction:

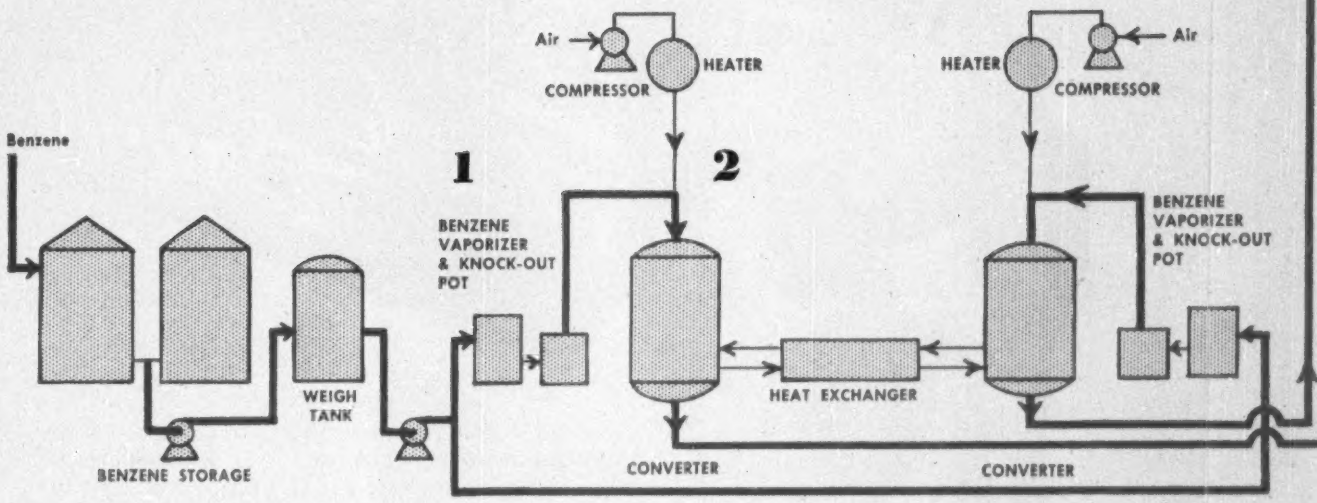
$$C_6H_6 + 4\tfrac{1}{2}O_2 \rightarrow (CHCO)_2O + 2H_2O + 2CO_2 \ldots$$

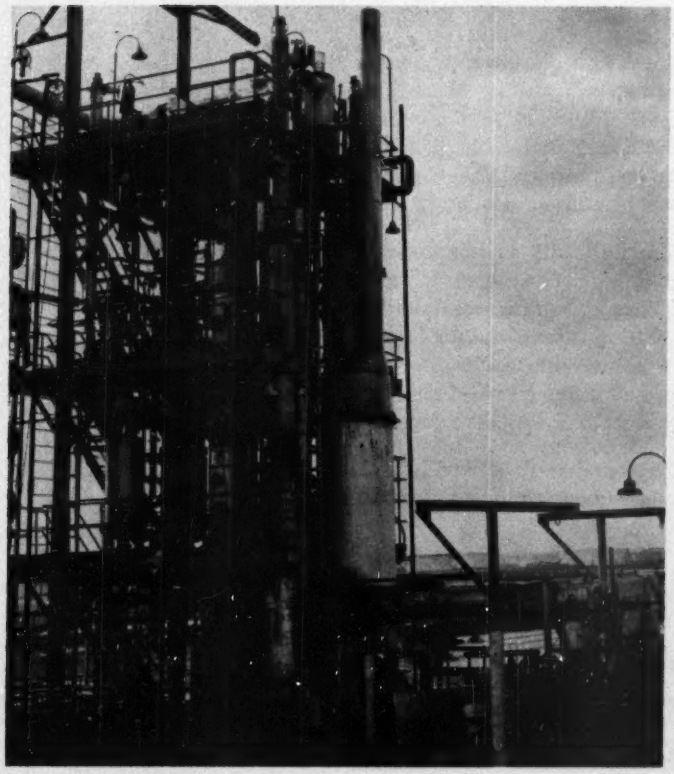
(50-60% yield)

Reaction products (consisting mostly of a maleic anhydride-maleic acid mixture, carbon dioxide, water, and some unreacted benzene) are taken from the converters and passed through heat exchangers into a common scrubber. Maleic acid is transferred from the scrubber to storage.

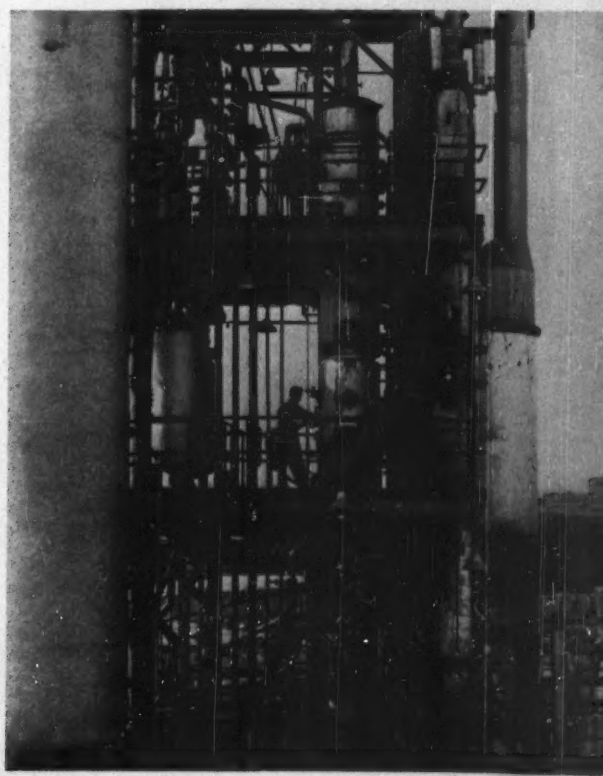
The maleic acid is then fed into a dehydrator in which all the water is driven off. Crude maleic anhydride is periodically pumped into storage. When a sufficient charge of crude maleic has been accumulated it is purified in a purification column.

First cut from the column is collected in a heads tank for recycling in the next run. The second, or heart cut, is transferred to storage and the last cut collected in a slops tank. The final product may be drummed, used molten in other processes, or pelletized.

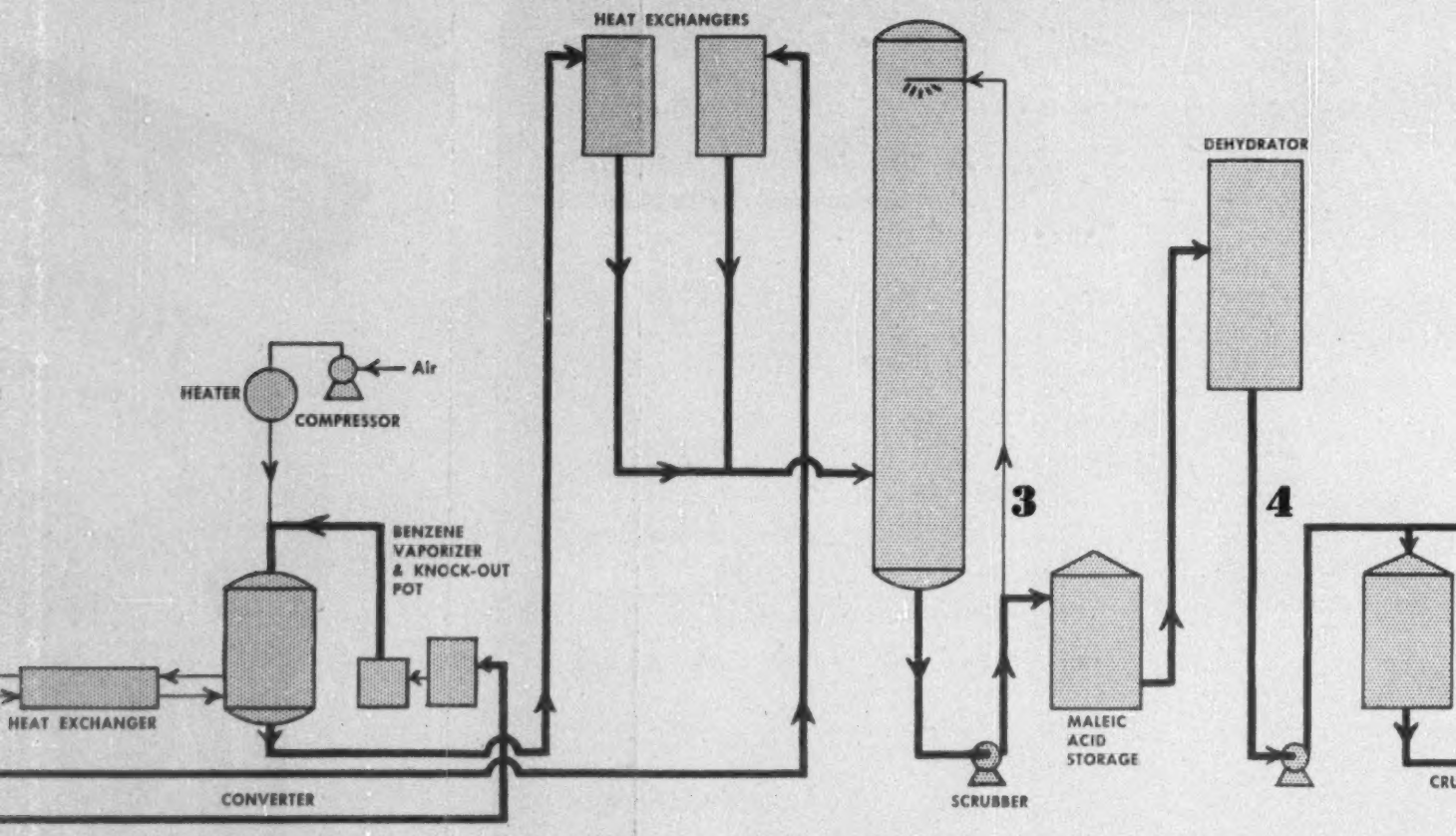


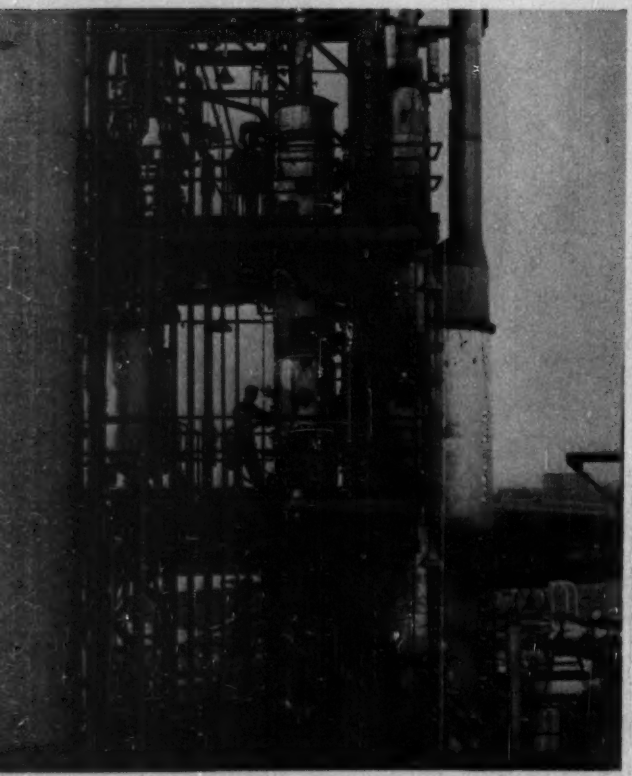


3 Scrubber (tall stack) handles cooled reaction products. Maleic acid is transferred from the scrubber to storage.

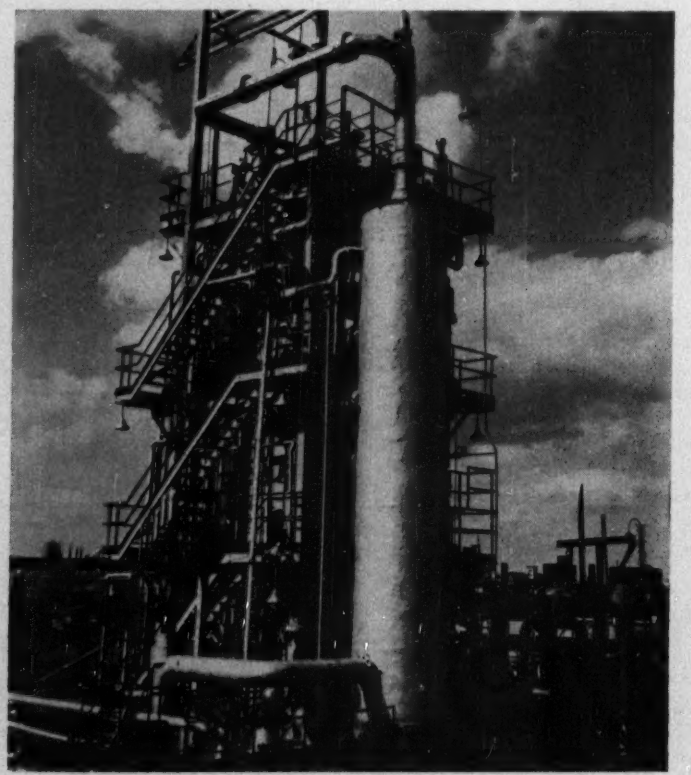


4 Dehydrator drives off all the water. Crude maleic anhydride is cally pumped from the dehydrator to storage.



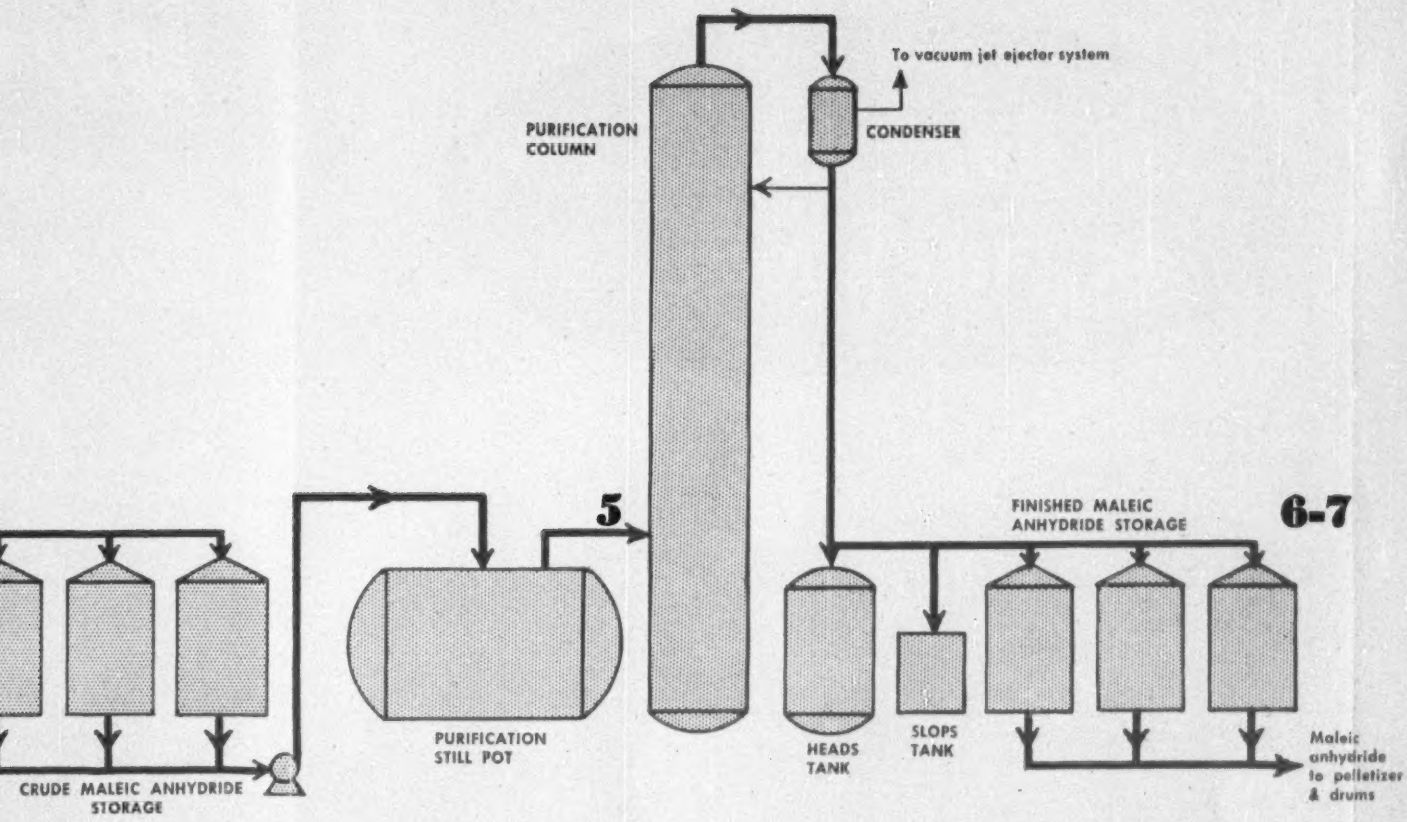


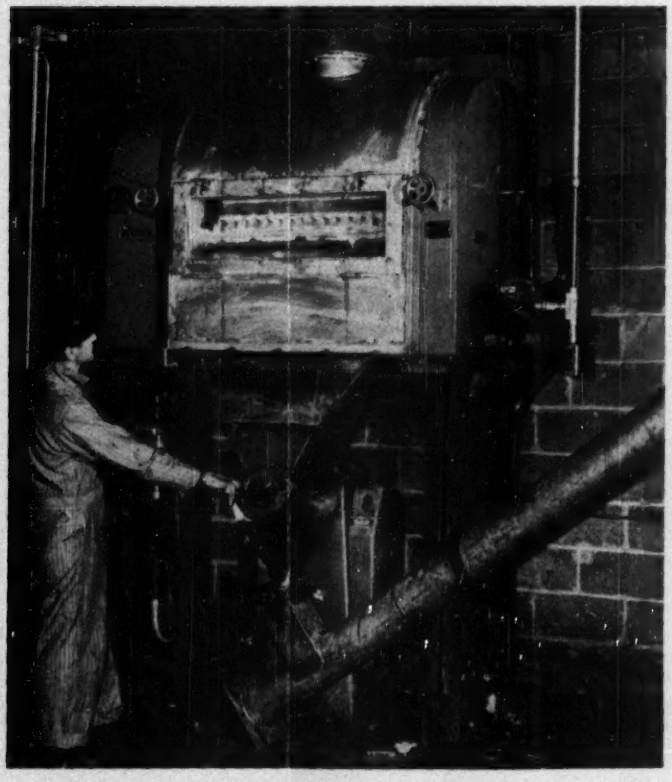
Dehydrator drives off all the water. Crude maleic anhydride is periodically pumped from the dehydrator to storage.



5 Purification column. The second, or heart cut, is transferred to storage for drumming, to be used molten, or for pelletizing.

6





6 Flaking machine converts molten maleic anhydride into flakes for use in the pelletizing machine.

7 Pelletizing machine converts flakes of maleic anhydride into pellets, one form of the final product.

Save Time... Reduce Labor ON THESE 6 JOBS!

1. **TO FILTER** a solid from a suspension.
2. **TO DRAIN** a solid by removal of surface moisture.
3. **TO DEHYDRATE** a solid by displacement of water or other liquid by miscible solvent.
4. **TO CLARIFY** a liquid by sedimentation.
5. **TO THICKEN** a suspension by a partial removal of a liquid.
6. **TO SEPARATE** a mixture of two or more miscible liquids, or an unfilterable, gelatinous material from a liquid.

TOLHURST "Center-Slung" Centrifugals do your processing jobs faster . . . more economically. New, improved design permits handling of 3 to 4 times greater out-of-balance loads. Less care is required for loading the basket. "Center-Slung" Centrifugals are available with split or full cover and can be constructed of any practicable material, as specified. Single speed or two speed motor drive, or infinitely variable speed hydraulic drive available. Basket sizes, 12" through 108" in diameter.

Many applications involve engineering problems which must be solved individually. Tolhurst maintains a complete laboratory for centrifugal research, completely equipped and staffed by experts to conduct trial runs on materials and equipment. Tolhurst also maintains competent field engineers who are available for consultation.

Write for Details and Prices

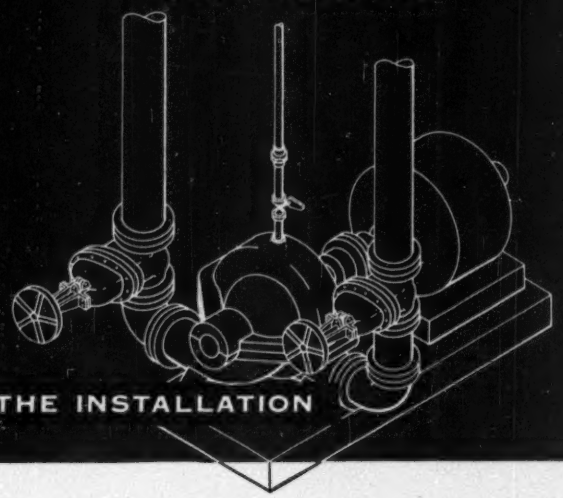
Tolhurst CENTRIFUGALS DIVISION

AMERICAN MACHINE AND METALS, INC.

EAST MOLINE, ILLINOIS

Will Your Valves Last 50 Years?

...on this Tough Pump Service, for instance



THE INSTALLATION

VALVE SERVICE RATINGS

SUITABILITY: Doing the job for 50 years

MAINTENANCE COST: Routine care only

SERVICE LIFE: Installed 1903—Now on new pumps

OPERATING RESULTS: No shutdowns for valve trouble

AVAILABILITY: Catalog item—Current No. 465½

At The Great Western Sugar Company, Longmont, Colorado, plant, with Crane Iron Body Wedge Gate Valves on suction and discharge lines of juice pumps.

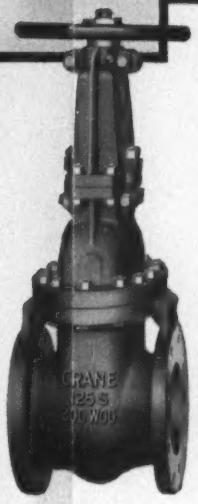
THE CASE HISTORY

Originally the Crane valves were installed on belt-driven pumps when the plant was built in 1903. In 1952, the old pumps were replaced. Nearly all the Crane valves were found in good condition and put right back in service on the new pumps.

It's no easy job these Crane 6 and 8-inch, 125-pound brass-trimmed gate valves have been doing since 1903. The plant operates on 80-day continuous beet sugar campaigns. In spite of intermittent operation, and with periodic routine maintenance only, the Crane valves never fail to operate freely, smoothly, and seat tightly. For 50 years they have assured dependable, positive flow control in event of pump failure—and they're still doing it.

THE VALVE

Here is today's model of these "50-year service record" Crane 125-pound iron wedge gates. Still made to the most rigid quality standards, these modern valves keep building unusual performance records in every industry. They come in patterns for every need. See your Crane Catalog or your Crane Representative.



THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

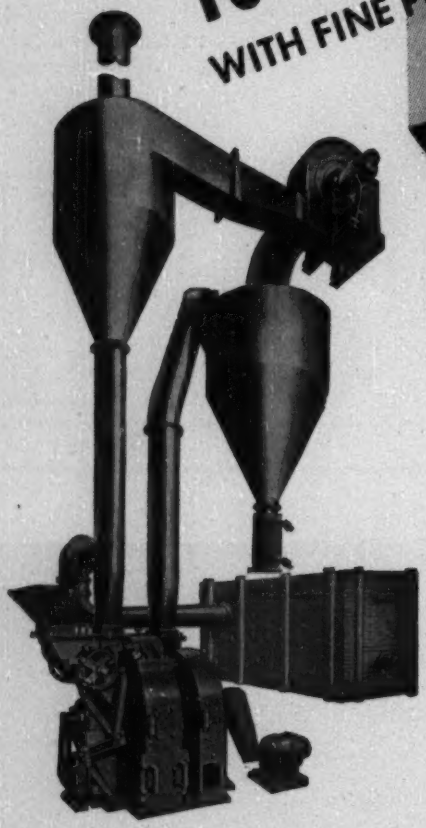
CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

The Answer TO THE MOISTURE PROBLEM WITH FINE PULVERIZING

RAYMOND Flash Drying



IF you wish to grind a material that contains moisture, no pre-drying is necessary when you use the Raymond system of Flash Drying in the mill. You just feed the wet product directly to the mill, where it is dried and ground simultaneously—classified and conveyed to the collector, and even air-cooled ready for bagging or storage.

This clean, dust-free automatic process gives you a quality controlled product of definite fineness, dryness and uniformity to meet your specifications. The instantaneous drying action permits high inlet temperature without detriment to the product. Heat-sensitive materials can be handled safely and economically by this method.

The flexibility of Raymond Flash Drying makes it widely adaptable to different materials and operations. There is a choice of equipment: Roller Mills and Imp Mills where pulverizing is involved; or Cage Mills when only disintegration of the material is required. For handling unusual chemical products, the exposed mill parts and piping may be of stainless steel or special alloys.

Raymond engineers will be pleased to recommend a system designed to fit your product specifications and capacity requirements.

RAYMOND Flash Drying CATALOG No. 54A

This book describes typical applications of Flash Drying to many different materials. Write for your copy.

COMBUSTION ENGINEERING, INC.

1311 NORTH BRANCH ST.
CHICAGO 22, ILLINOIS

Raymond PULVERIZER DIVISION

SALES OFFICES IN PRINCIPAL CITIES

GUIDED TOUR CONTINUED

YOU AND YOUR JOB

Save your health for your peak earning years. 246

CORROSION FORUM

12% Chromium steels..... 262

NAMES IN THE NEWS

Allen Abrams, new IRI president..... 281

INDUSTRIAL NOTES

Who's doing what among suppliers..... 303

CHEMICAL ENGINEER'S BOOKSHELF

How to give your money away..... 309
Your checklist of recent books & pamphlets... 314
New literature from the manufacturers..... 318

CHEMICAL ECONOMICS

Top ten consumers on the chemical hit parade. 326
Wages outstrip C of L index..... 334

TOMORROW'S TECHNOLOGY

New high speed ball mill..... 338
Double solvent extraction yields aromatics.... 342
Your checklist of new patents..... 344

READER SERVICE

You can get more information—free..... 425

Engineers can live longer . . .

. . . if they'll just follow a half-dozen simple rules of health and common sense. Here they are—by popular demand *(You & Your Job)*.

More on stainless steels.

This month we tell you about the 12 percent chromium steels and how they stack up against corrosives (*Corrosion Forum*).

The Big Ten chemical users.

Fertilizers lead the parade in volume, textiles in value—but down the line a lot of shifting takes place *(Economics)*.

Unique high-speed ball mill.

That's just one of the unusual ideas you'll find in this month's run-down of new patents *(Tomorrow's Technology)*.

AND—Index of Advertisers precedes your Reader Service section inside the back cover.

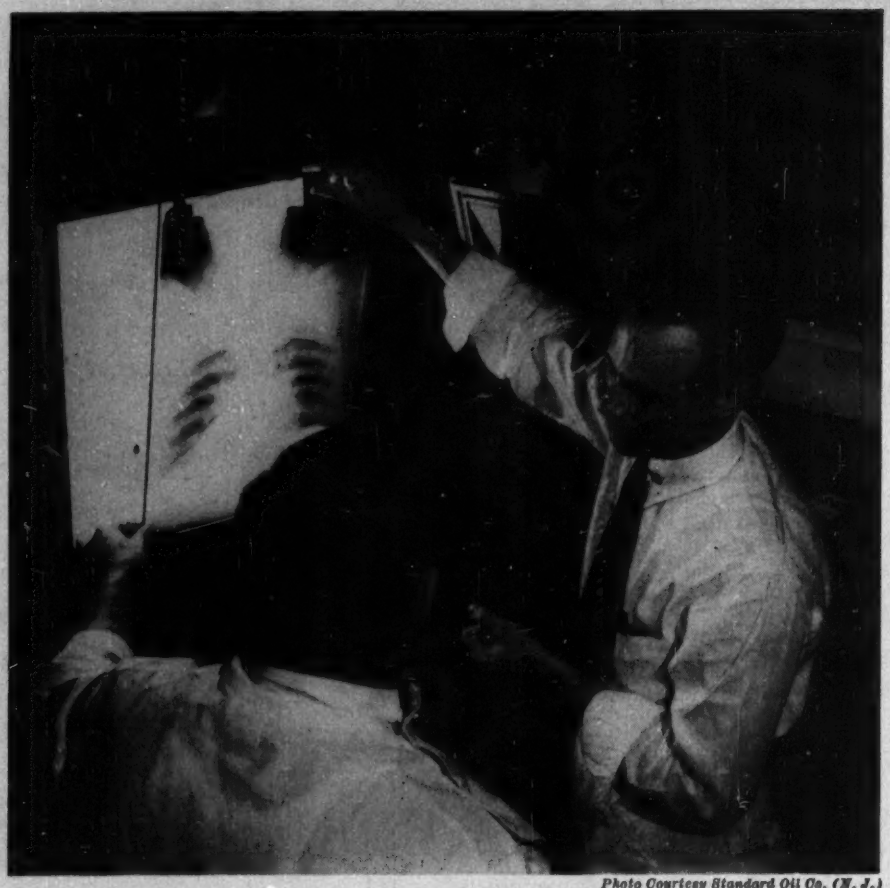


Photo Courtesy Standard Oil Co. (N. J.)

Save Your Health for Your Peak Earning Years

Averages show that you'll realize highest earning potential between 50-60. Yet that's when your health will give out if you don't keep tabs on it now.

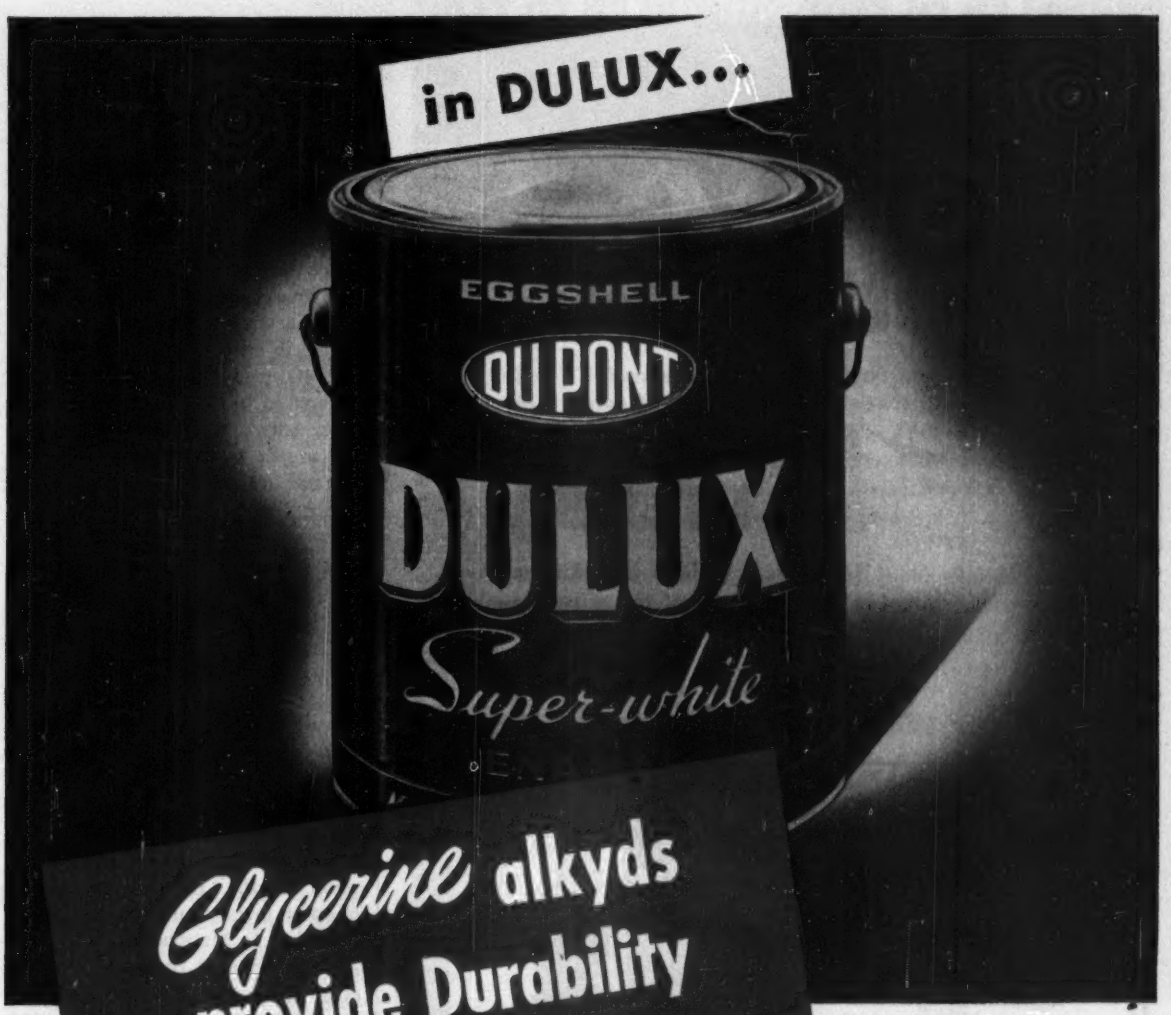
Does your company keep a finger on your pulse and an eye on your endocrine cycle? If it doesn't it's not very smart as companies go today.

Lately, more and more chemical companies are coming to realize that efficient work is related to good health. And top company brass knows that if all of its engineers worked at top efficiency most of the time, many of its technical personnel shortages would disappear. That's why well-managed outfits aren't missing any bets or pinching any pennies when it comes to doing anything to keep their engineers healthy, happy and productive—or in some cases just keeping them.

The idea of giving employees a physical checkup once a year or so, isn't new. Some companies have been footing this type of bill for their top executives for the last 60 years. But extending this type of preferred treatment to engineers is newer. "Why not?" said one personnel man we talked to "with all this talk about shortage, this company does more fussing about its engineers than its president."

▶ **The Company's Stake**—But there's more to it than paternalism and selfishness. According to the Metropolitan Insurance Company Policyholder's Service Bureau, practically all the companies with health exams for their engineers are enthusiastic for more practical reasons. In more than a few cases, key engineers and executives have been found to be victims of the early stages of seriously disabling conditions like cancer and coronary disease which, unchecked, would knock them off the production line before they were 50.

In fact, among 2,000 annual health examinations made by Life Extension Examiners in 1949, 800 patients had



Glycerine alkyds provide Durability

The DuPont Company pioneered the development of alkyd resin finishes during the twenties, and for many years has used Glycerine alkyds in its popular "Dulux" finishes to provide gloss and color retention, durability, and relatively fast dry. Dulux's unusual combination of properties makes it a favorite in applications ranging from house shutter and trim paints to automotive finishes... from refrigerator and appliance coatings to marine paints.

When alkyd resins were first introduced, they virtually revolutionized the paint industry. E. I. duPont de Nemours & Company has used Glycerine alkyds since the twenties to formulate many of its famous finishes for the industrial, automotive, and trade sales fields.

Glycerine-derived alkyds improve color retention and film toughness in air-drying coatings for metal equipment. They contribute flexibility and adhesion to baking finishes—where their compatibility with other resins like ureas and melamines is essential.

America's leading paint makers have also found Glycerine easier to work with in the critical resin-making operation. For light-colored alkyds, Glycerine is available to meet the exacting standards of the color-conscious paint industry.

"Why Glycerine for Alkyd Resins and Ester Gums?" tells the story of these applications with detailed information on the chemical and physical properties of Glycerine. For your copy, write Glycerine Producers' Association, 295 Madison Ave., New York 17, N. Y.

Nothing takes the place of Glycerine

SPARKLER FILTERS · SPARKLER FILTERS

Quality... Filtration

SPARKLER FILTERS

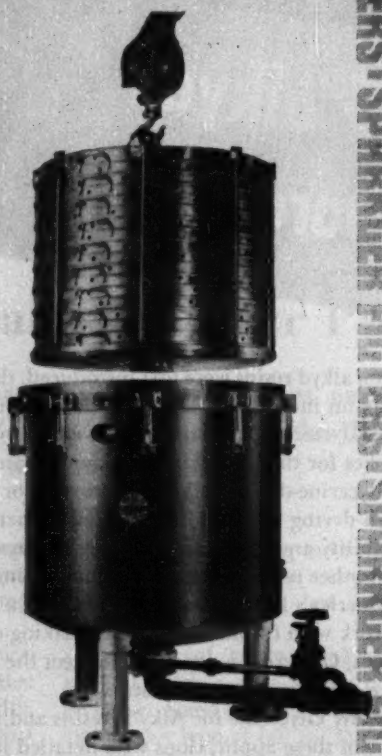
High quality, sharp filtration has always been one of the prime features of Sparkler Filters. Many times Sparkler Filters have been chosen by experienced filtration engineers for this one point of superiority.

Here's why

... any kind of filter paper, cloth, or screens, and any filter media can be used to obtain maximum efficiency.
... no breakage of the filtering surface even with intermittent operation as pressure is not required to hold cake in position on the horizontal plates.
... flow is always with gravity, down through the cake in a natural direction. The cake will not break, crack or slip because it is supported in a horizontal position and is not subject to tensile or distortive strain.

When you are looking for fine quality filtering, Sparkler Filters will do the job.

For personal engineering service write Mr. Eric Anderson.



Sparkler representatives in all principal cities.

Makers of Filters for the Chemical, Pharmaceutical, Food and Petroleum Industries for over a quarter of a century.

SPARKLER MANUFACTURING COMPANY
Mundelein, Ill.

Sparkler International, Ltd. Prinsengracht 876, Amsterdam, Holland

Sparkler Western Hemisphere Corp, Mundelein, Ill., U. S. A.

SPARKLER FILTERS · SPARKLER FILTERS

physical complaints of one form or another, 270 had elevated blood pressure, 300 had abnormal electrocardiograms, 242 had defective vision, 448 were overweight and the remaining 623 had other abnormalities, most of them serious. The average age in this group was 42.5 years.

With a shortage of executives as well as engineers, no company can afford to lose its men at age fifty. Yet perhaps 400 men out of the 2,000 would be unable to work at fifty if their abnormality at forty were to exist without proper treatment for ten years. The real tragedy in these cases, though, is not the company's but the individual's—when early attention could have aborted a malignant condition.

So much for the company, how do you, the individual, fit into this picture?

First, if your company has a program take full advantage of it. It's costing the stockholders anywhere from $10 to $300 per exam with the average somewhere around $30.

► **Your Stake in You**—If your company has no program, plan to take the $30 out of your own pocket and consult your doctor. It'll be one of the smartest investments you ever made. According to Metropolitan it's a good idea to have a thorough check-up every three years if you're under 30, every two years if you're 30-40, every year between 40 and 60 and twice a year over 60.

The scope of the basic exam will vary with your needs and complaints but a general suggestion is a complete history and physical, blood count, urinalysis, blood sugar measurement, chest x-ray, electrocardiogram and a flat x-ray plate of the abdomen. Such an exam usually takes half a day with reports available to you, in 24 hours.

Chances are that during your lifetime you've given a lot more care to many a heat exchanger and broken-down boiler than to your own power plant. But just try wiring the St. Louis spare-parts depot when that pump in your thoracic cavity starts clanking. The only man who can help you then is your receiver in bankruptcy—your priest or minister.

Well, so much for trouble-shooting. What about preventive maintenance and efficient operation between check-ups at the clinic?

That secret is all tied up neatly in diet, rest, and recreation.

Here are ten rules that you've heard a hundred times before, rules that probably won't be followed much. And even if they are followed they may not make a new man of you. If they're ignored, though, you'll *certainly* turn up on the scrap heap a lot sooner than you ought to.

▶**1. Watch Your Diet**—Best bet is to check with your doctor at the time of your exam. Dietary requirements differ with physical makeup and with activity. Doctors and dieticians tell us Americans eat too much—and too much of the wrong kind of foods. While there are tons of books and pamphlets distributed by commercial publishers, the government, and the insurance companies telling us to drink more milk and eat more lettuce, it's better to have the doctor "tailor" the diet to the individual. And though you may have laughed at vitamins, they've made countless men of forty feel like twenty again. But don't fall for the food faddists and quacks and don't try to be your own doctor. The medical men say that a man who treats himself has "a fool for a doctor and a bigger fool for a patient."

▶**2. Get Some Exercise and Fresh Air**—Exercise has two advantages. It keeps muscles firm thereby keeping excess fat from collecting over them, and it speeds up the elimination of dead cells and other waste products.

▶**3. Get Plenty of Sleep**—Again individual requirements differ but you can find out how much you need by going to bed at different hours and testing yourself: (1) when you get up; and (2) throughout the day. Doctors tell us that a midday nap, whenever possible, is the best system for taking care of yourself. And if you think that midday snooze is less than admirable read how Edison mastered the system of cat-naps throughout the day or—better still—read between the lines in the biographies of some of our military generals. Their biographers herald the fact that their working day is 16-18 hours long. But they don't always tell us that that 18 hour stint includes a 3-hr. lunch with a 2-hr. nap. That's smart. In fact, if you have to work long hours over a protracted period it's the only way to be around to enjoy your grandchildren. Lack of adequate sleep leads to nervousness, irratibility, loss of memory

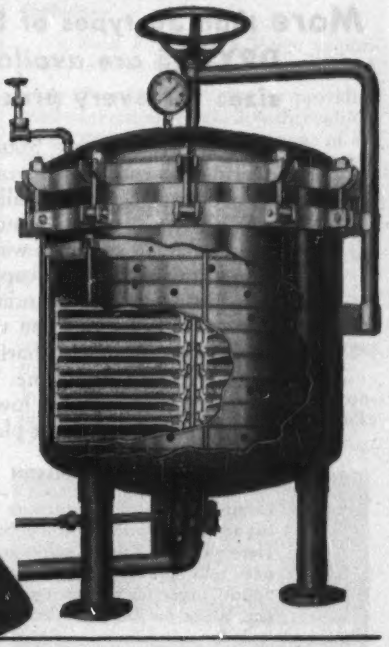
In Whiskey Filtration,

recent developments in testing various types of filters by well known whiskey experts in one of the largest Kentucky distilleries give the following report.

"A horizontal-plate filter replaces a vertical-screen filter and a pulp filter in series. Cost of primary filtration is reduced 70%. Removal of barrel char is consistently better. Flow rates increased 20%; total gallons filtered, between cleaning cycles, is three times greater."

This complete report as published in a well known engineering publication is available on request. Write Mr. Eric Anderson for a copy.

SPARKLER
Horizontal Plate
FILTERS



. . . are replacing many old type filters in whiskey production as they have in the chemical and pharmaceutical field because of definite economy features and for high quality of performance.

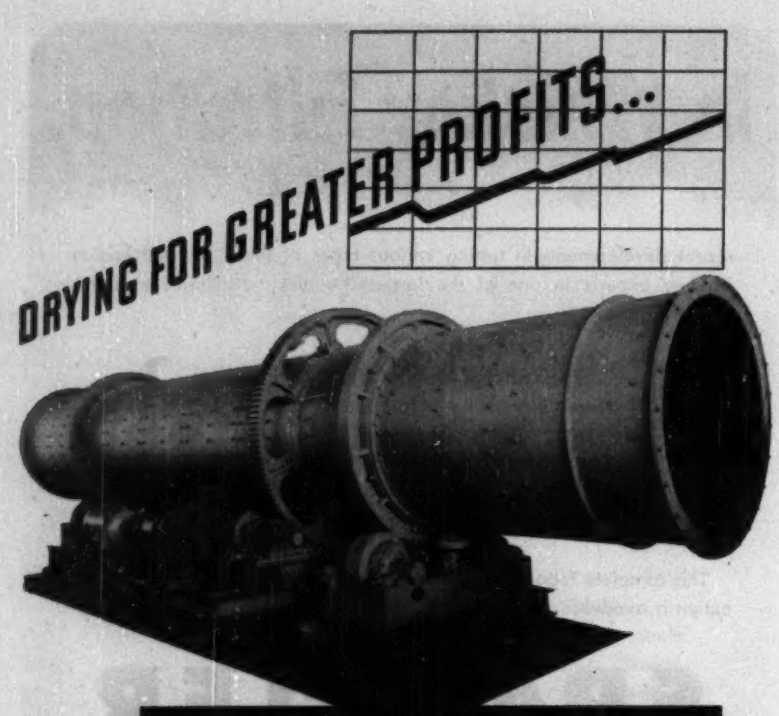
Service representatives in principal cities.

SPARKLER
MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

Sparkler International, Ltd.
Prinsengracht 876 Amsterdam, Holland

Sparkler Western Hemisphere Corp.
Mundelein, Ill., U.S.A.

Makers of fine filtration equipment for over a quarter of a century



WITH STANDARD-HERSEY
ROTARY DRYERS

More than 30 types of* STANDARD-HERSEY DRYERS *are available in all commercial sizes for every process industry need

Here is a case where Standard-Hersey advanced engineering has made teamwork pay dividends in stepping up production of artificially colored roof granules.

With the previous system, consisting of dryer, kiln and cooler, in series, it was found that production was being limited by dryer capacity.

Addition of the Standard-Hersey *pre-heater*, shown above, rounded out the team. It works like a double header locomotive in sharing the dryer load and thereby cutting drying stage time. Urgent production schedules are being met at much lower cost than the outlay for a second complete 3-unit plant.

SEND FOR NEW DRYER BULLETIN

Complete illustrated brochure describing advantages and features of Standard-Hersey Dryers, Kilns, Coolers and Calciners; tells operation of Standard-Hersey "pilot" dryer for pre-testing your product. *Write for Dryer Bulletin No. 531.*

STANDARD HERSEY *Dryers*

STANDARD STEEL CORPORATION
5005 Boyle Ave., Los Angeles 58 • 7 East 42nd St., New York 5

and cloudy thinking. And it's a lot better to operate at 90 percent efficiency for 8 hours than 40 percent for 12 hours.

▶**4. Drink Moderately or Not at All and Don't Be a Smokestack**—Stimulants in small doses probably won't do much harm, if any, though certainly, they'll never do you any good. A good rule of thumb: When you stop deriving pleasure from a stimulant and yield to habit, it might be a good idea to become master of the situation again.

▶**5. Don't Overwork or Overworry**—Mental disease affects more people than all other diseases combined. And while excessive worrying and working may never drive you off the reservation, it can take its toll in many less serious forms: ulcers, nervous breakdowns, excessive fatigue, insomnia, irritability, listnessness. Excessive work or worrying can also rob us of the satisfactions we need—from our job, family and the world around us.

If you're overworked, better take a work inventory. Most cases of overwork are due to bad habits: putting things off; failing to organize: insisting on doing everything yourself; wasting time and similar reasons. If you've been working overtime for a prolonged period, take stock of what you've accomplished. Did you work late one night only to do practically nothing the next day? Could you have eliminated unnecessary jobs and accomplished as much in less time? Find out what keeps you overworked and eliminate it. If there's just too much work for one man, you need: (1) an assistant; or (2) a new job.

If you worry too much get a copy of Dale Carnegie's book "How to Stop Worrying and Start Living." The author has a formula that really works. Briefly, he says take your worries—money, job, whatever—and decide what is the worst possible thing that can happen—loss of your job, compulsion to borrow money etc. Then resign yourself to the worst. Merely defining something and pinning it down takes the fear out of it. Carnegie says that 90 percent of the things we fear never happen anyway. And when, 9 times out of ten, the terrible calamity that we resigned ourselves to never materializes we get a pleasant surprise.

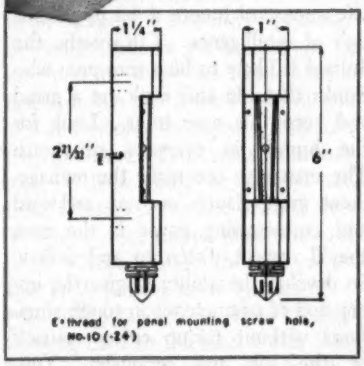
▶**6. Keep Away from Ruts and Boredom**—If we were to study juvenile

TRADE PAPER EDITION
Published by
SCHUTTE and KOERTING Company
ENGINEERING News
JET APPARATUS • HEAT TRANSFER EQUIPMENT • ENGRAVINGS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT

New, Inexpensive SK Purge Rotameters* Indicate and Permit Manual Control of Fluid Flow in Small Quantities

***featuring a back flow check valve and flow control valve**

$13.00 each, net consumer, F. O. B., Cornwells Heights, Bucks County, Pa. In ordering, always state Fig. No., Meter Size, and Scale Marking.



Here's a really new type Rotameter—the SK Fig. 1846CV Purge Rotameter. It's small (weighs ½ lb.) and inexpensive, yet particularly well designed and sturdily constructed with a one-piece body. It is ideal for use in indicating and manually controlling fluid flow in low flow ranges where good reproducibility but only moderate actual metering accuracy are required.

With this small, variable area type flow meter, the rate of flow of fluid passing through the meter is indicated by the position of a ball float moving in a tapered glass meter tube. The rate of flow is read in reference to the center of the ball float on a scale mounted alongside of the meter tube.

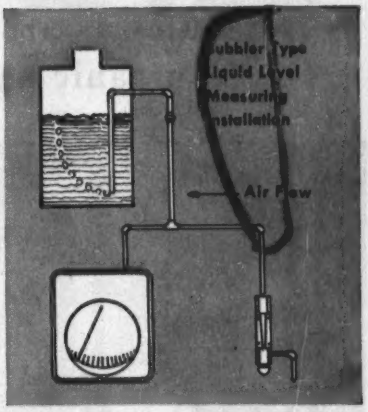
Typical applications include the indication of—

. . . flow of supply air in Bubbler Type Liquid Level Measuring Installations, see drawing.

. . . flow of purge fluid, generally water or air, in the pipelines connecting orifices, venturi tubes, or nozzles to differential head flow meters.

. . . flow of transparent purge fluid to sight glass indicators of Rotameters measuring the flow of opaque fluids.

. . . flow of purge fluid to indicator extensions of indicating Rotameters or to extension wells of Rotameters with electric or pneumatic transmitters where the process fluid carries slurries, tends to settle out crystals, or may form surface coatings.



. . . flow of sample fluid to measuring installations for continuous analysis of fluids.

Special features of the Purge Rotameter include—

. . . a Back Flow Check Valve to positively prevent back flow of process fluid.

. . . a Flow Control Valve for providing sensitive control of fluid flow through the meter over the entire flow range of the meter at differential pressures between 1 to 100 psi across the control valve.

. . . a rigid one-piece meter body which will withstand rough handling in pipe installations and effectively protect the glass tube.

. . . a design particularly suitable for installing directly in pipelines or mounting on instrument panels or in larger instrument cases.

Price, as noted is $13.00 each, net consumer, F.O.B., Cornwells Heights, Bucks County, Pa. Order now.

Meter		Flow Conn.	Rotor Type	Flow Ranges		Pressure Drop	Scale Marking
Type	Size			Water at 70° F	Air at 10 psig & 70° F		
Fig. No.	No.	Inches	No.	gph	cfh	psi	
1846CV	03RZ	⅛ NPT	RB033		.2—2	.8—1	.2—2
	01RZ		RB010	.4—4		1.3—1.5	.4—4
	1RZD		RB10	.1—1** 1—8	.1—2** 2—30	1.5—2	0—10

Note: Meter and valve bodies are made of anodized aluminum. Control valve shaft is made of stainless steel. Maximum Operating Temperature is 200° F. Maximum Operating Pressure is 200 psig.

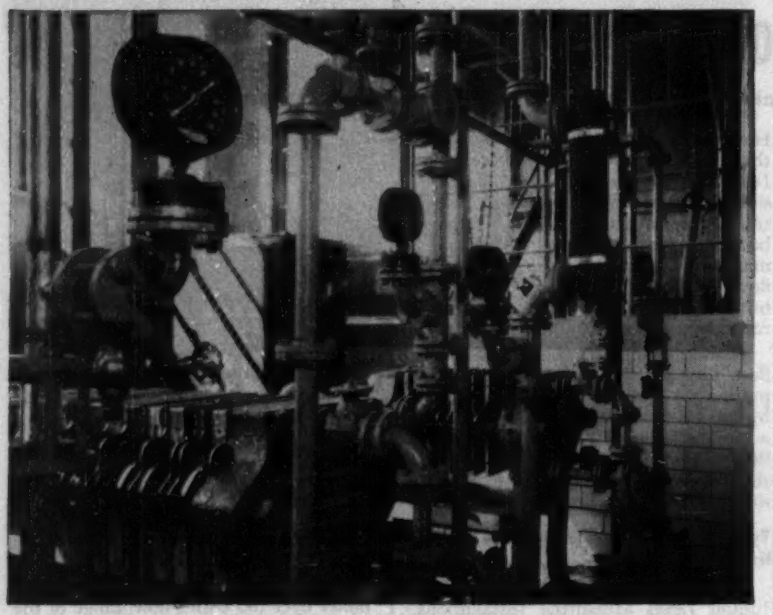
***The low and high flow ranges are obtained in the lower and upper half of the double taper meter tube respectively.*

SCHUTTE and KOERTING Company
Manufacturing Engineers
CORNWELLS HEIGHTS
BUCKS COUNTY, PA.
Representatives in Principal Cities

DOW

SARAN LINED PIPE SERVICES FILTER PRESS INSTALLATION

This Saran lined piping handles a carbon slurry of an organic acid solution



Saran Lined Pipe Company
2415 Burdette Ave.,
Ferndale, Mich.

Please send me a copy of your catalog on Saran Lined Pipe, Valves and Fittings.

Name_____

Title_____

Company_____

Address_____

City_____

State_____

1503-8

A large midwest corn processor required piping suitable for handling a carbon slurry of an organic acid solution to and from filter presses in a new pilot plant. Saran lined pipe, fittings and valves were the company's choice for the following reasons: Saran lined pipe, fittings and valves assure tight, leak-proof joints. The excellent corrosion resistance of strong, rigid saran lined pipe assures a maximum service life and a minimum of down time. Saran lined steel pipe can be delivered immediately, cut and threaded to your specifications, or fabricated in the field without special tools.

Saran lined pipe may be the answer to your own requirements. For further details write or call the SARAN LINED PIPE COMPANY, Ferndale, Michigan. Offices in New York • Boston Pittsburgh • Tulsa • Philadelphia • Chicago Portland • Indianapolis • San Francisco Houston • Denver • Los Angeles • Seattle Cleveland • Charleston, S. C. • Toronto Montreal.

RELATED SARAN PRODUCTS

Saran rubber tank lining • Saran rubber molding stock • Saran pipe and fittings • Saran tubing and fittings

you can depend on DOW PLASTICS DOW

and adult delinquents, psychologists tell us, we'd find that their troubles began with boredom. To a lesser extent that's true of everybody. If you let a job get monotonous by getting too close to it or working too hard at it, you soon get to doing it badly. And if you do a bum job you get to hate it. And pretty soon you're: (1) in a rut; (2) out of a job; or (3) neurotic —or all three. So keep the right perspective on your job. We work to live not vice-versa. Keep your job dynamic. If the Du Pont Co. were still making nothing but smokeless powder, it would have ceased to be, long ago.

Handle the routine parts of your job quickly, efficiently and well. We get the most satisfaction out of those things we do best.

If you're bogged down at your desk or in the shop for long hours put on your hat and take a walk once in a while. Balance your contact with machinery and paper with live contacts—people. Enjoy people, study people, help people and use people to help you.

▶ **7. Laugh and Relax**—Have you ever noticed that the more intelligent a person is the better is his sense of humor? If you have, your judgment is substantiated by psychologists who rate a sense of humor as an important sign of intelligence. Conversely, the dullard is likely to be a sour-puss who thinks that life and work are a grind and keeps his nose to it. Look for the humor in everyday situations. The man who can make the management group laugh over an awkward and embarrassing pause is the man they'll respect, listen to and follow. So develop the ability to give the impression of competence in tough situations without taking either yourself or the job too seriously. Your superiors, being human, will tag you as a man who handles heavy responsibility easily. They'll admire you because they know the same responsibility would have scared the pants off of anyone else. You may have been scared but a laugh or a smile will inspire confidence where a worried look or an anguished grunt would engender misgivings and doubt.

Relaxation will keep your mental and physical battery up to full charge. When you need power the full potential will be there. And you won't run

the risk of dipping below a safe potential where deterioration sets in.

You can relax with whatever you like to do best whether its "bending an elbow" (a technical term), watching a ballgame, playing a round of golf or collecting sea shells. Just don't expect to relax at a ballgame if your team's in a slump and blows the game because the manager does everything wrong and the umpire favors the opposition. You'd probably be better off staying at home in this case.

▶ **8. Self- Discipline.**—This is the rule that rules whether or not the other nine do you any good. Good intentions don't produce results; good actions do. If you don't buy that extra pack of cigarettes, or if you do get that tough job done and out of the way—these are the "ifs" that affect your health and life span. Begin with a modest list of good resolutions and master these. Even if you start by merely cutting down on your smoking by one cigarette a day. Then, with the confidence of mastering your one or two small resolutions, go on to more and bigger things, a little at a time. This is a lot better than attempting too much and getting discouraged when you fail. "Nothing succeeds like success" may be trite but it's true.

▶ **9. Find Your Escape**—If you don't have an avocation, you're missing a lot unless your avocation is your vocation. Whether you call it a hobby, or an escape or a sideline or "loafing," everyone needs to get away from the sameness of living an exact routine. Some people like a succession of hobbies and escapes toying with each until they get tired, then trying something else. Others would be satisfied with trout fishing for the rest of their lives. Whatever your escape make the most of it. Chances are its the best preventive medicine for mind and body.

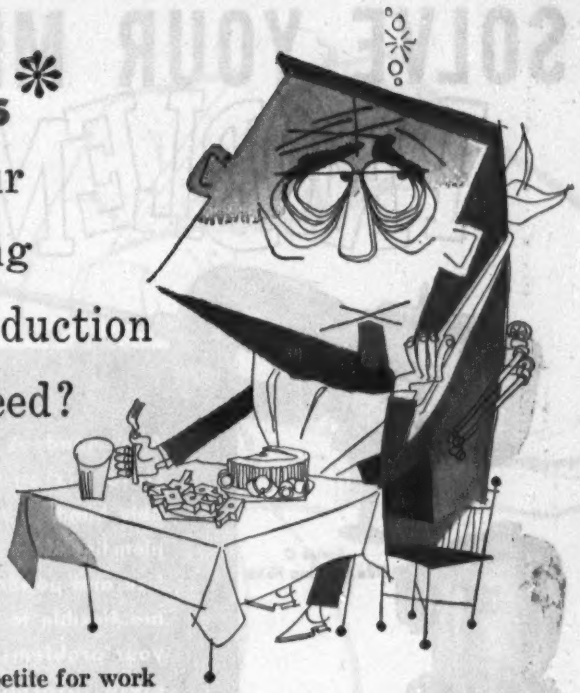
▶ **10. Keep Checks on Your Health**—Getting back to the reason this thing was written, see your doctor for a thorough check-up as often as he advises or according to the age scale mentioned earlier.

Life is a pay-as-you-go plan. You don't draw interest on the vacation you put off from year to year. Instead you might put aside the money you save. Buy you a swell gravestone.

But by now you and I are pretty savvy in taking care of ourselves.

So see you at the centenarian whingding. *(Continued)*

does **coil-itis*** have your processing tank production off its feed?



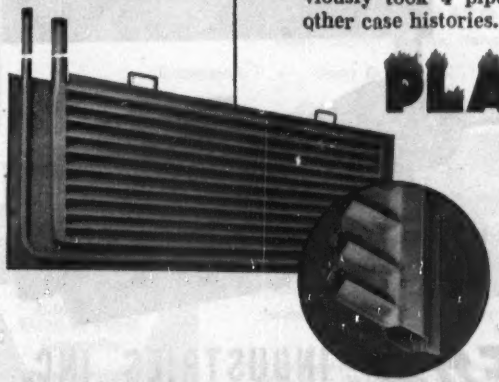
When the appetite for work of your heating and cooling processes diminishes, the trouble may well be coil-itis. For, downtime due to pipe failures and limitations can seriously delay your production flow. Switch to Platecoils, the new tonic for production, as revolutionary as the new wonder drugs. Platecoils take 50% less tank space leaving more room for greater payload. They heat or cool 50% faster. They simplify maintenance and save hours of downtime. Equally important, Platecoils cost as much as 50% less in the first place. Platecoils cure production troubles involving heat transfer and give production a shot in the arm.

Write for Bulletin P61 today!

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS ELIMINATE A 6-TO-8 HOUR-A-DAY CHIPPING JOB

At Sealed Power Corp., installation of Platecoils has completely eliminated a 6-to-8 hour-a-day chipping job. Three Platecoils now heat a tank that previously took 4 pipe coils. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

*Coil-itis — Diagnosed as tank heating and cooling problems. Platecoils — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, TRANTER MANUFACTURING, INC., LANSING 4, MICHIGAN

SOLVE YOUR MIXING PROBLEMS

A tremendous variety of fluid mixing needs are ably handled by the complete line of Eastern Mixers. Size and power of mixers are flexible to help solve your problems. For complete information and engineering data, write for Eastern Fluid Mixing Catalogs. Eastern engineers are always available to work out your complex mixing problems with you.

EASTERN INDUSTRIES ★ MIXER DIVISION ★

Eastern INDUSTRIES, INC.
Dept. A, Regent St., Norwalk, Conn.

WHAT MANAGEMENT EXPECTS

. . . From the Engineer

What management expects from the engineer depends in a great measure, on management itself. Management can and does vary, from mismanagement to enlightened, progressive management.

▶**The Sales Engineer**—Management has the right to expect the sales engineer to know his product, as well as the function the product performs for the customer. Through this knowledge, he is able to ascertain the needs of his customer and to recommend the proper equipment or product that will be of utmost utility to the customer and be made at a profit by his own company. In addition, management expects the sales engineer to furnish information and data relative to product or services that will assist management to formulate its long range policies regarding established, as well as new products and service. These data also influence the decisions of all the other engineering departments regarding product design, research and manufacturing.

▶**The Research Engineer**—Management expects the research engineer, not only to develop the ideas of the sales engineer, but also ideas from other branches of the business, and ideas that may have suggested themselves from products previously developed. In addition, management expects the research engineer to exercise judgment in his decisions so that the men under his direction and his budget allowance will not be wasted on projects, interesting but not pertinent to the company's program.

▶**The Design Engineer**—Management expects the design engineer to design a product of maximum utility at a cost that will give a profit so that the company can maintain its competitive position in its field and keep abreast of the development of new processes and materials that would improve and possibly reduce the cost of his product. Management also expects him to organize his efforts so that the engineering personnel are effectively employed in carrying out the long range policies of the company, such as simplification of product lines and parts standardization.

▶**The Production Engineer**—Manage-

Production Basis Testing!

The Swenson Research Laboratory Spray Dryer is commercial-size . . . the results you get from tests on barrel or carload lots will match those of actual production conditions!

Here's your cup of coffee!

See what Spray Drying "Magic" can do for your Product

Instant coffee, made fresh in your morning cup, is but one of many products made possible and profitable with spray drying "magic." This chemical process for drying, as developed and perfected by Swenson, has given new form, wider markets and easier merchandising to a host of best sellers . . . pigments, pharmaceutical extracts, ceramic powders, malted milk and many chemicals. The list is getting longer every day. What about your own product . . . can spray drying give it new worlds to conquer? You can find out by talking to Swenson *now* . . . by getting all the facts on how important Swenson experience can be in your future plans for profits!

SWENSON EVAPORATOR COMPANY

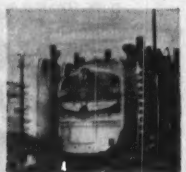
15669 Lathrop Avenue, Harvey, Illinois

Evaporators • Spray Dryers • Crystallizers • Filters

WHITING EQUIPMENT SERVES ALL INDUSTRIES

Overhead Cranes

Foundry Equipment



Railroad Equipment

Other Whiting products include: Trambeam Overhead Handling Systems, Electric Chain Hoists, the Trackmobile, Aviation Equipment, and Metal-Working Machinery.

SWENSON

Proved Engineering for the Process Industries

SINCE 1889

A Division of WHITING Corporation

faster cleaning

For

STAINLESS STEEL EQUIPMENT

If quick cleaning is one of the factors that determines your use of stainless steel processing equipment, remember this:

A STAINLESS STEEL VESSEL WITH ROUND CORNERS CLEANS FASTER—MORE THOROUGHLY—THAN ONE WITH *SQUARE* CORNERS. Whether you clean with brush or cloth—you can "get at" all the surfaces of a round-cornered vessel easily. There are no corners in which residue can hide.

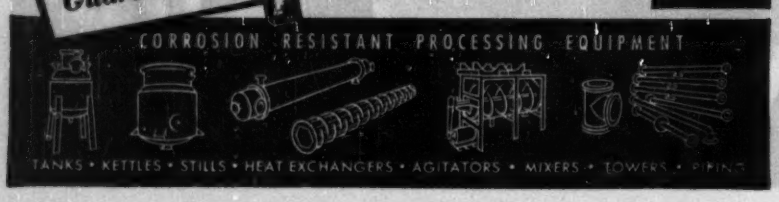
Having worked exclusively with stainless steel and alloys for many years, we have developed to a high degree the techniques needed to fabricate processing equipment with round corners.

Using tools and dies of our own design, we build your vessels so that cleaning time in your plant is cut to a minimum. Result: your stainless steel equipment costs less to operate and lasts longer. Consult with us.

S. BLICKMAN, Inc., 607 GREGORY AVE., WEEHAWKEN, N. J.

S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK
A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."



ment expects the production engineer to know the capabilities, capacity and potential capacity of the existing production plant and to schedule material and men to meet the quota set up by the company's order file. In addition, management expects the production engineer to produce the product as specified by the design engineer, at or below the estimated cost.

▶**The Industrial Engineer**—Management expects the industrial engineer to provide ideas, as to job specification, improved plant layouts, and materials handling, equipment improvement and replacement, the setting up of bonus and incentive systems.

In addition to the specific requirements mentioned for the various engineering groups, management expects each engineer in his sphere to do his part in the teaching and training of personnel in order to supplement the company's long range program for the selecting, acquiring and training of engineering personnel. Finally, management expects the engineer in any specific group of engineering endeavor to take the initiative in acquiring knowledge in the fields of finance, advertising and personnel relations, particularly as they influence the engineer's situation as a member of the management team.

While progressive management expects many things from the engineer, it must be prepared to do its part to justify its demands. To do so management must make clear-cut decisions. It must have faith in the engineer, as a member of the management team, to exercise sound judgment.

It must be alert and aggressive so that the company grows and the opportunity for advancement presents itself. Finally, it must be prepared to set forth in a clear and concise manner, its organizational and operational policies, so that the engineer will understand and accept the scope of his responsibility and authority within the management team.

When the engineer meets with his fellow engineers and discusses this subject, he must face these facts. The engineer is certainly in management today. In many cases the engineer, collectively, is management. When an engineer in management sets forth what is expected from a fellow engineer, he must ask himself if he is

measuring up to what is expected of him as a member of the management team. He knows that management, good, bad or indifferent is the result of how each member of the management team measures up to what is expected of him. For management is not a commodity, rather it is a force; a force created by a group of individuals, many engineers, united in an effort to plan and direct the utilization of men, material and equipment toward a desired goal at the best possible efficiency.—*H. B. Riehl, Proctor & Schwartz, Inc., before the ASME, Detroit, April 15, 1953.*

HIGH SCHOOL STUDENTS

. . . *College Entrance Program*

A program to help alleviate the shortage of engineering talent in this country has been evolved by the University of Dayton.

According to the school's Dean, Bro. J. Albert Wehrle, S.M., national surveys taken in the last few years have shown that upwards of one-third of the students who are admitted to engineering schools in the colleges and universities of the country need some type of refresher work. Additional studies have shown that one out of three freshman students drop out of engineering by the end of the first year. Major reason for this is poor preparation, the studies show.

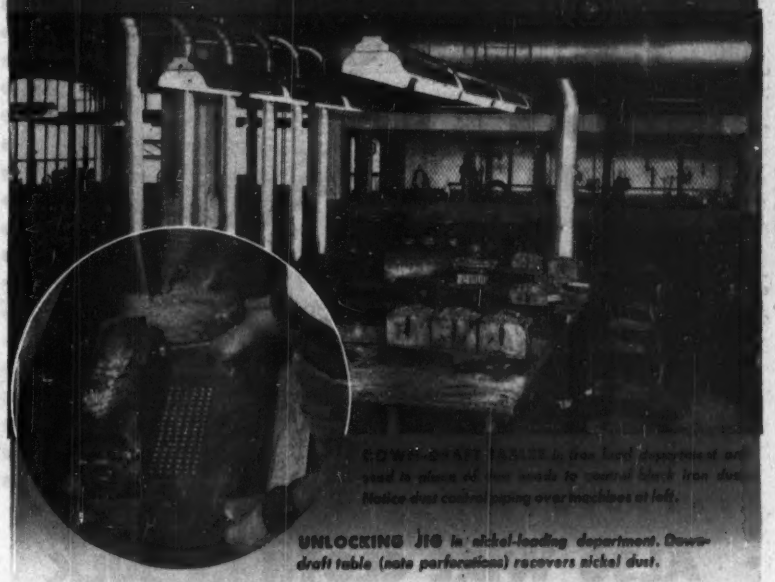
Some freshmen need 15 credit hours of work before actually beginning their engineering program.

"With a few, it is a question of low marks, but with most, it is the fact that they have not had the courses at all or only had parts of them," the Dean continued. "Then when they get to college in the Fall, they are faced with taking refresher courses or postponing the start of their college work to take the basic courses with college credit. This means that many students eventually must postpone their graduation by taking an extra semester or devoting one or two summers catching up. To me this means a great waste."

University of Dayton's answer to the problem is a three-point program of testing, interpretation and summer refresher courses. The university will offer to all technical high school students, free engineering aptitude tests.

"We are introducing this testing program in the following communi-

Pangborn Dust Control
pays for itself
in recovered material
at Thomas A. Edison, Incorporated



UNLOCKING JIG in nickel-loading department. Down-draft table (note perforations) recovers nickel dust.

MANUFACTURING nickel-iron-alkaline storage batteries at Thomas A. Edison, Incorporated, creates nickel, nickel-hydrate, and iron-oxide dusts. Control and recovery of these valuable dusts was complicated by their light weight, which in some processes prevented the use of regular dust-collecting hoods. Pangborn engineers solved this problem by utilizing down-draft tables in a unique dust control system geared to Edison's particular requirements.

RESULTS? The Pangborn system pays for itself in recovered dust alone. In addition, the dust-free atmosphere has improved working conditions in the plant. Although this Pangborn dust control system is a major installation, it was completed without loss of a single day's production!

WHAT ARE YOUR DUST PROBLEMS? Find out how Pangborn can help you. Mail the coupon below today for Bulletin 909-A.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

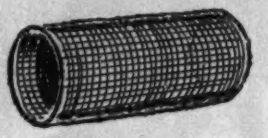
Pangborn **DUST CONTROL**

STOPS THE DUST HOG from stealing profits

PANGBORN CORPORATION, 2600 Pangborn Blvd., Hagerstown, Md.
Gentlemen: Please send me a copy of Bulletin 909-A.
Name.....
Firm.....
Address.....
City..... Zone..... State.....

filter leaves?

strainers?



sizing screens?

Cambridge can build almost any type of wire cloth part to your specifications. Most likely the type of special wire cloth assembly you use has been built here in our plant. Our factory men can work from your specifications, or our Engineering Department can draw up working prints and specs based on merely your description of what the part must do. Why not let us quote the next time you need special wire cloth forms?

ALSO WIRE CLOTH IN BULK

...from warehouse or woven to order. We can also supply you with wire cloth in bulk for your own fabrication. Many common types are ready for immediate shipment from stock. And if your order needs special production, we'll schedule our looms to have the material in your plant without delay. We can weave wire cloth in any metal or alloy and in sizes from 20 x 250 mesh up to 4" openings.

WRITE FOR CATALOG
For complete information write direct for this illustrated catalog. Or call in your Cambridge Field Engineer for a conference in your plant. He's listed under "Wire Cloth" in your classified phone book.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department G
Cambridge 7, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

ties, now," Rensel said, "with the hope that we can serve many of the students in these areas who are planning to enter engineering colleges in the Fall. . ." Cleveland, April 11th, Cathedral Latin School; Cincinnati, April 11th, Purcell High School; New York, May 2nd, Chaminade High School, Mineola; Pittsburgh, April 25th, North Catholic High School; Dayton, May 2nd, at the University of Dayton.

The tests to be given are national standard tests for engineering aptitude and qualifications. Any high school senior in the area may take the tests by applying to Rensel at the Guidance Center at the University of Dayton, Dayton 9, Ohio. There will be no charge. Results will be returned within 10 days of the testing date.

After the student has received the results he will then know whether or not he will need refresher courses before enrolling in the regular engineering courses. For those needing refresher work, the University, as the third point of its program, has established a special summer session of eight weeks to remove any weaknesses of lack of entrance requirements.

"Any student, no matter where he is planning to go to college, may take the tests and enroll in the summer school. Then by Fall he will be ready to enter engineering courses as a full freshman and complete his requirements within the specified time."

READING SPEED

. . . *Increase It*

If you're an average adult you can read 250 words per minute, you learned to read in the fourth grade and you haven't done anything in a conscious way to improve your reading skill since then.

If you want to, you can double your reading skill in a short time and with very little effort. Here are seven hints. Incidentally, if you want to check yourself, this article contains 367 words. A fast reader can scan and digest it in 30-40 seconds.

To read faster:

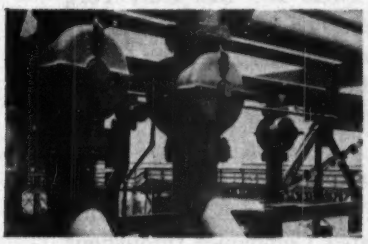
1. Find out how rapidly you read by selecting from a magazine an article of interest. Read with the intent of comprehending for exactly three minutes and then determine your rate in words per minute.

Non-retarded straight-through flow

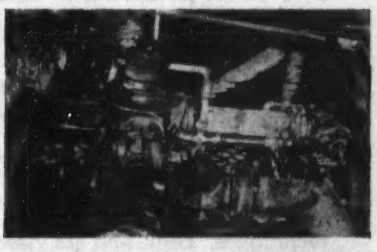
. . is guaranteed by a.c.f.'s Round Port Valves because the valve opening is *exactly* the same size and shape as the pipe itself.
As a result you get full capacity flow of heavy viscous ladings, no loss in head pressure. Materials in suspension have no abrasive effect.

Full pipe area and the non-wedging effect of CYLINDRICAL Plug Design is also available in a.c.f. Rectangular Port Valves. It will pay to get all the facts about *both* before you buy. Call your nearby a.c.f. Representative now or write direct for information.

IN PETROLEUM AND GAS INSTALLATIONS a.c.f. Valves provide full flow with no pressure loss, fastest sure operation.



IN PROCESSING a.c.f. Round Port Valves are ideal for such materials as cement slurry with straight-through uninterrupted flow.



TWELVE YEARS OF SERVICE for these a.c.f. Valves handling hot asphalt is evidence of service-free performance.

a.c.f.

Write for Catalog 4-CM, American Car and Foundry Company, Valve Division, 1501 E. Ferry Ave., Detroit 11, Michigan

CYLINDRICAL FULL PIPE AREA

PLUG VALVES

Representatives in 50 Principal Cities

Now they "wash"
14½ million gallons
of water every day...

Suppose you're several million gallons short of the water you need. One good solution to the problem is the re-use of the water you have.

When Pennsylvania Glass Sand Corporation, Berkeley Springs, W. Va. had that very problem, they worked with Dorr engineers to build this 5-acre installation that recovers 14½ MGD of silt-laden water. Three 250′ dia. Dorr Torq Thickeners are installed in an earthen basin 775′ long by 275′ wide. Dirty water comes from a battery of Dorr Classifiers used for washing sand in the reduction building, then passes through a Dorr Hydroseparator for the removal of fine sand before final settling.

Whenever a process involves the separation of finely divided solids in suspension, the use of ion-exchange, or fluidizing techniques, Dorr and its Associated Companies throughout the world can provide the correct equipment for your job. THE DORR COMPANY, Barry Place, Stamford, Conn.

Torq is a trademark of The Dorr Company
Reg. U. S. Pat. Off.

Better tools TODAY to meet tomorrow's demand

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in principal cities of the world.

YOU AND YOUR JOB, cont. . .

2. In your reading, force yourself to move ahead. Don't go back over material that seems hazy, but try to clarify meanings as you progress down the page. The more regression, the slower the reading.

3. Before actually reading, survey the material. Anticipating what the author is going to say makes for increased speed. In reading a detective story you learn to solve the crime before the author does.

4. Form the habit of grouping words into thought units. Take the sentence, "The boss wants this finished by five o'clock." Break it into thought units like this: "Boss—wants this finished—by five." Words have more meaning when grouped into thought units.

5. Don't read every word. The efficient reader automatically supplies words such as *a, and* and *the.* It is more important to concentrate on ideas. Omitting excess baggage in a sentence does not alter its meaning but it does increase reading speed.

6. Be aware of the pauses the eyes make in their forward movement during which they are able to focus on the print. The more pauses, the more inefficient the reader. The eyes should move in a definite rhythm, pausing about the same number of times each line, and about the same length of time each pause. There should be few regressions.

7. Make periodic time checks of your reading speed. And practice, practice, practice. You will find that no matter how fast a reader you are now, you can still improve.—*Copyright, 1953, Steel*

ENGINEERS

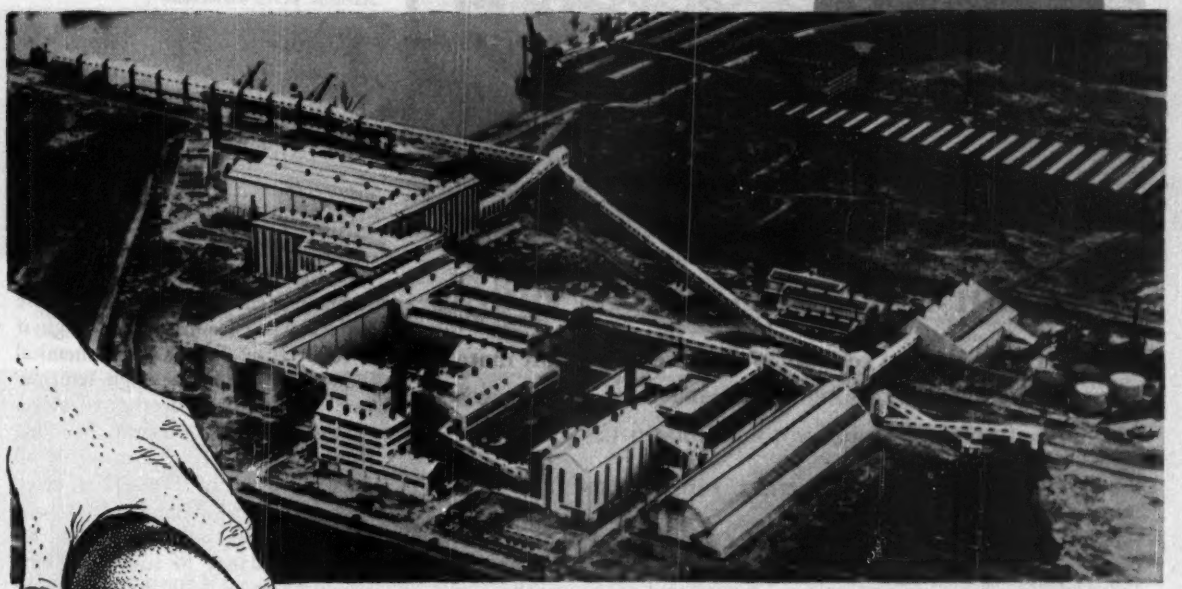
. . . *Ratio to Total Employees*

A recent survey conducted by the National Society of Professional Engineers indicates that the ratio of engineers to total employees in defense and defense-supporting industries has changed from an average of one engineer to every 40 employees in 1940 to about one engineer to every 20 employees in 1952. The present engineering demand was found not to be based on defense alone; modern industrial, business, and scientific requirements call for more engineering manpower than ever before.

FISONS, LIMITED...

Great Britain's First Triple Superphosphate Plant

Annual design capacity at the modern fertilizer works of Fisons, Ltd., Immingham, England, is 70,000 tons of triple superphosphate; 50,000 tons of single superphosphate; 75,000 tons of granular compounds. The phosphoric acid and triple superphosphate granulation processing units were designed by The Dorr Company's Consulting Engineering Department.



Free flowing granules . . . important characteristic of concentrated chemical fertilizers produced by Dorr-designed plants.

Fisons, Limited, in their ultra-modern fertilizer works at Immingham, England, made skillful use of Dorr knowledge and methods.

Dorr knowledge comprises 35 years of experience — gained through furnishing equipment or designing and constructing plants for the production of concentrated granular fertilizers by the wet process. Dorr methods include such refinements as the exclusive Fines Recirculation System used at Fisons... the only system which can interchangeably produce triple superphosphate, ammonium phosphates and sulfate, or complete concentrated products in a 100% granular form of exceptional uniformity.

In fertilizer plant design, facilities are important too. Dorr's Consulting Engineering Department is staffed by engineers fully qualified to handle all phases of fertilizer plant design — from economic analysis to supervision of initial operation. And, it has available complete facilities for any laboratory testing and pilot plant study which may be indicated.

If you are considering the fast-growing chemical fertilizer field as a potential producer — or if you plan to expand your present production facilities — it will pay you to check with Dorr. Write for Bulletin #8000, or better still, let us send an engineer to discuss your problem from the standpoint of economics and process. There's no obligation, of course.

DORRCO

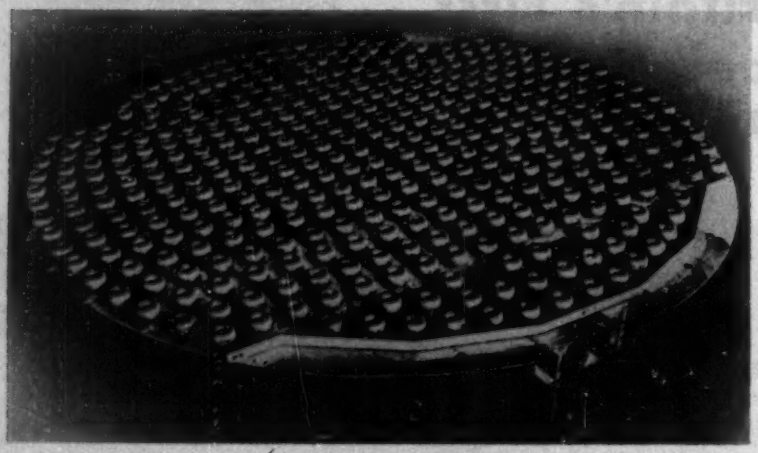
Better tools TODAY to meet tomorrow's demand.

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.



12% Chromium Stainless Steels

The corrosion resistance of these important materials of construction to a number of corrosives, with physical and mechanical properties and applications in the CPI.

COMMITTEE OF STAINLESS STEEL PRODUCERS
American Iron and Steel Institute

NOTE: *This is one of a series on stainless steels. Refer to the first article in the series in the April issue for what to consider in the selection of stainless steels regardless of grade.*—EDITOR.

The 12 percent chromium stainless steels (actually 11.5—14 percent chromium), though the "leanest" stainless in quantity of alloying elements, have a definite corrosion resistance that makes them useful in such chemical processing applications as heat exchangers, bubble caps and trays, inner liners, sizing and dewatering parts and screens, troughs, flumes, and conveyor belts.

Hardenable by heat treating, these erosion and wear resistant alloys have fair cold forming characteristics and are satisfactory for hot work or forging. Most are air hardening and must be slowly cooled or annealed after forging to prevent cracking.

Both the corrosion resistance and mechanical properties of the 12 percent chromium stainless steels are directly dependent on the heat treatment accorded them. These materials have maximum corrosion resistance in the fully hardened condition.

Effect of Temperature on Properties

AISI Stainless Type	403 410	416
Creep strength, annealed, psi. (1% set in 10,000 hr.)		
1,000 F.	9,200	.....
1,100 F.	4,200	.....
1,200 F.	2,000	.....
1,300 F.	1,000	.....
1,500 F.	.....	.....
Maximum service temperature (in air), F.		
Continuous	1,250	1,250
Intermittent	1,500	1,500
Low-temperature (−80 F.) properties, annealed		
Tensile strength, psi.	128,000	.....
Yield strength, psi.	94,000	.....
Elongation in 2 in., %	22	.....
Izod impact, ft-lb.	25	.....

Typical of the 12 percent chromium stainless formulations is Type 410. Like the other alloys in this series it is not recommended for use where severe corrosion is encountered although it is still very useful for some chemical industry applications. High temperature and pressure superheated steam valves, fractionating towers, handling equipment for abrasive materials all take advantage of Type 410's excellent mechanical properties and wear resistance. This alloy also offers excellent resistance to scaling at temperatures up to 1,200 F. and can be used successfully for furnace parts operating below that temperature.

Other 12 percent chromium stainless alloys are specialty grades formulated for a specific set of desirable characteristics. Thus Type 403 is a 12 percent chromium stainless made to special quality requirements for steam turbine buckets. While embodying the same general physical, mechanical and corrosion resistant characteristics of the whole family, Type 403 also meets the stringent

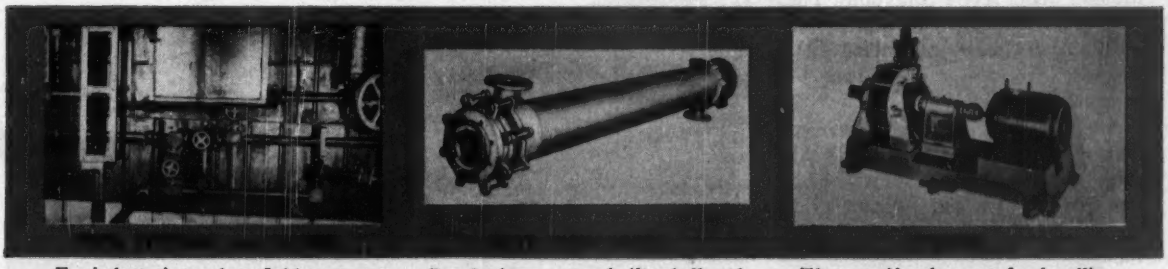
Representative Mechanical Properties of Chromium Steels, Hardenable Types—After Hardening and Tempering (1 In. Diam. Bars)

Types	Hardening Temp. F.	As Quenched Hardness Brin.	Rock.	Tempering Temp. F.	Ultimate Tensile Strength, Psi.	Yield Str. 0.2 Percent Offset, Psi.	Elon. in 2 in., Percent	Red. of Area, Percent	Izod Impact V-Notch, Ft. Lbs.	Hardness Brin.	Rock.
403, 410	1,800	410	C43	400	190,000	145,000	15	55	35	390	C41
				600	180,000	140,000	15	55	35	375	C39
				800*	195,000	150,000	17	55		390	C41
				1,000*	145,000	115,000	20	65		300	C31
				1,200	110,000	85,000	23	65	75	225	B97
				1,400	90,000	60,000	30	70	100	180	B89
416	1,800	410	C43	400	190,000	145,000	12	45	20	390	C41
				600	180,000	140,000	13	45	20	375	C39
				800*	195,000	150,000	13	50		390	C41
				1,000*	145,000	115,000	15	50		300	C31
				1,200	110,000	85,000	18	55	30	225	B97
				1,400	90,000	60,000	25	60	60	180	B89
440A	1,900	570	C56	600	280,000	240,000	5	20	4	510	C51
440B	1,900	590	C58	600	280,000	270,000	3	15	3	555	C55
440C	1,900	610	C60	600	285,000	275,000	2	10	2	580	C57

* Tempering within the range of 750 to 1,050 F. is not recommended due to low and erratic impact properties.
Data from AISI Steel Products Manual, Section 24, April, 1950.

THE NATIONAL CARBON *LINE*

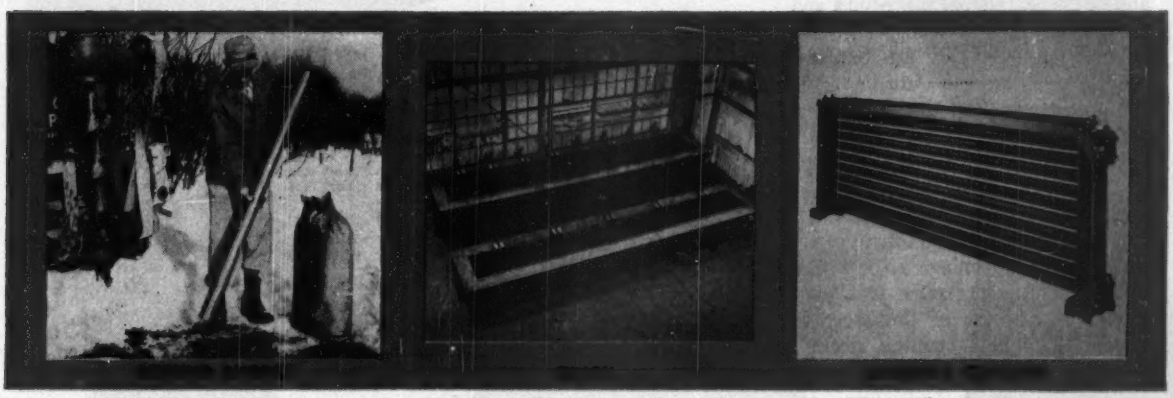
Specify "National" Carbon and Graphite and "Karbate" Impervious Graphite Equipment for Processing and Conveying Corrosive Fluids.



For industry's toughest fluid-conveying requirements. Easy to install and maintain with simple hand tools. Catalog Section S-7000.

Standard or custom-built; shell and tube, concentric and immersion types in stock sizes. Catalog Sections S-6620 S-6670, S-6740, S-6750.

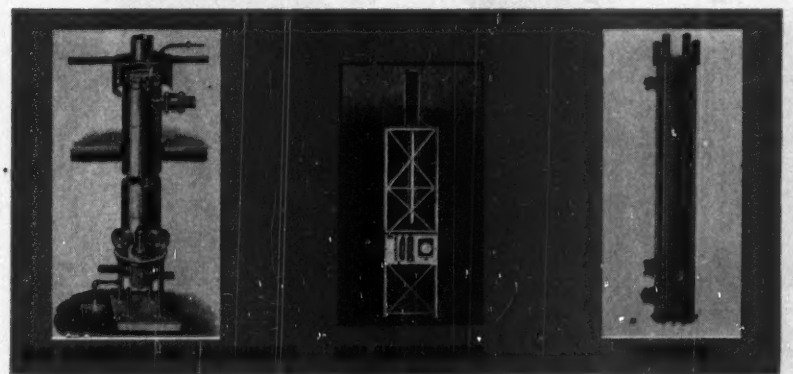
The centrifugal pump for handling corrosive fluids. Rugged, trouble-free design. Handling capacities to 800 G.P.M. Catalog Section S-7200.



"National" Graphite Ground Anodes for cathodic protection of buried or submerged metal structures. Catalog Section S-6510.

Accepted material for lining tanks, towers, digesters and other vessels containing corrosive chemicals. Catalog Section S-6210.

New "Karbate" coolers feature standardized, sectional construction... high heat-transfer rate... low initial cost Catalog Section S-6820.



Versatile, standard equipment for hydrogen chloride synthesis. Burns moist gases. Simple in operation. Catalog Section S-7530.

Compact, light-weight unit produces up to 20 tons per day of 22° Baumé acid. Minimum installed cost. Catalog Section S-7460.

For absorption, fractionation, scrubbing. Easily erected from standard sections and components. Catalog Section S-7350.

For further information write to National Carbon Company

requirements that turbine applications demand.

For those parts where machining is in order such as valves, instrument parts, fittings, cams, etc. Type 416, the most readily machinable of all the stainless steels, can be used. Type 416 displays the same order of corrosion resistance as the other alloys of the group and has similar mechanical characteristics except for impact strength under severe conditions. The alloy is 85-90 percent as machinable as Bessemer screw stock (B-1112), whereas Type 410 is only about 54 percent as machinable.

All the alloys of the 12 percent chromium stainless family are weldable. However, sound welds involve the use of special techniques. For example, the high hardenability of these alloys may cause cracks to appear unless the weld is both preheated and postheated. The entire unit should, if possible, be annealed. There are, of course, normal procedures and equipment for annealing units as large as an entire tank car, but economic considerations usually limit the size of the unit that can be so treated. For such cases, Type 405 is often specified to take advantage of its non-hardening nature.

A low carbon analysis (C = 0.08 max.) and added aluminum retard this alloy's hardening, give welded areas that remain softer and more ductile than those of the other 12 percent chromium stainless steels.

Some mention should be made of stainless Types 440A, 440B, and 440C. Like the 12 percent chromium stainless alloys discussed here, they are also heat treatable. They can be made to attain the highest hardness of any of the stainless steels and have their best corrosion resistance when in the fully hardened condition.

These alloys are especially useful if equipment calls for hardened parts such as bearings or specially wear resistant valves. Corrosion-wise they

(Continued on page 272)

Representative Mechanical Properties

AISI Stainless Type	403	405	410	416	440A	440B	440C
Sheets and strip, annealed							
Tensile strength, psi	65,000	65,000	65,000	.....	.....	.....	.....
Yield strength, psi	35,000	40,000	35,000	.....	.....	.....	.....
Elongation in 2 in., %	25	25	25	.....	.....	.....	.....
Rockwell hardness	B-80	B-75	B-80	.....	.....	.....	.....
Bars, annealed							
Tensile strength, psi	75,000	70,000	75,000	75,000	105,000	107,000	110,000
Yield strength, psi	40,000	40,000	40,000	40,000	60,000	62,000	65,000
Elongation in 2 in., %	35	30	35	30	20	18	14
Rockwell hardness	B-82	150*	B-82	B-82	B-95	B-96	B-97
Endurance limit, psi	40,000	.....	40,000	40,000	.....	.....	.....
Bars (1"), cold drawn							
Tensile strength, psi	.....	85,000	100,000	100,000	115,000	120,000	125,000
Yield strength, psi	.....	70,000	85,000	85,000	90,000	95,000	100,000
Elongation in 2 in., %	.....	20	17	13	12	9	7
Rockwell hardness	.....	185*	B-94	B-94	B-99	C-23	C-24
Endurance limit, psi	.....	.....	53,000	53,000	.....	.....	.....

* Brinell.
Data from AISI Steel Products Manual, Stainless & Heat Resisting Steels, Section 24, April 1950.

Chemical Composition, Percent

AISI Stainless Type	403	405	410	416	440A	440B	440C
Nominal designation	Turbine Quality 12% Cr Hardenable	Welding 12% Cr Not heat-treatable	Basic 12% Cr Hardenable	Free machining 12% Hardenable	16-18% Cr Hardenable	16-18% Cr Hardenable	16-18% Cr Hardenable
Carbon	0.15 max.	0.08 max.	0.15 max.	0.15 max.	0.60-0.75	0.75- 0.95	0.95- 1.20
Manganese	1.00 max.	1.00 max.	1.00 max.	1.25 max.	1.00 max.	1.00 max.	1.00 max.
Silicon	0.50 max.	1.00 max.	1.00 max.	1.00 max.	1.00 max.	1.00 max.	1.00 max.
Phosphorus	0.04 max.	0.04 max.	0.04 max.	*	0.04 max.	0.04 max.	0.04 max.
Sulfur	0.03 max.	0.03 max.	0.03 max.	*	0.03 max.	0.03 max.	0.03 max.
Selenium	.....	.....	.....	*	.....	.....	.....
Mo or Zr	.....	.....	.....	.....	0.75 max.	0.75 max.	0.75 max.
Chromium	11.50-13.00	11.50-13.50	11.50-13.50	12.00-14.00	16.00-18.00	16.00-18.00	16.00-18.00
Nickel	.....	.....	.....	.....	.....	.....	.....
Nitrogen	.....	.....	.....	.....	.....	.....	.....
Titanium	.....	.....	.....	.....	.....	.....	.....
Aluminum	.....	0.10- 0.30	.....	.....	.....	.....	.....

* P, S, or Se, 0.07 min.
Data from AISI Steel Products Manual, Stainless and Heat Resisting Steels, Section 24, April 1950.

Physical Properties & Working Characteristics of Annealed Chromium Stainless Steels

AISI Type Numbers	403	405	410	416	440A	440B	440C
Modulus of elasticity in tension, psi	29 × 10⁶	29 × 10⁶	29 × 10⁶	29 × 10⁶	29 × 10⁶	29 × 10⁶	29 × 10⁶
Modulus of elasticity in torsion, psi	.....	.....	.....	.....	.....	.....	.....
Density, lb./cu. in.	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Density, g./cu. cm.	.....	.....	7.7	.....	.....	.....	.....
Specific elect. resist. at room temp. microhms/cm./sq. cm.	57	60	57	57	60	60	60
Magnetic permeability	Ferromagnetic	Ferromagnetic	Ferromagnetic	Ferromagnetic	Ferromagnetic	Ferromagnetic	Ferromagnetic
Specific heat, Btu./lb./°F. (32-212 F.)	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Thermal conductivity, Btu./hr./ft.² per ft./°F. 212 F	14.4	.....	14.4	14.4	14.0	14.0	14.0
392 F	.....	.....	15.0	.....	.....	.....	.....
572 F	.....	.....	15.5	.....	.....	.....	.....
752 F	.....	.....	16.1	.....	.....	.....	.....
932 F	16.6	.....	16.6	16.6	.....	.....	.....
Mean coefficient of thermal expansion per °F. 32-212 F	5.5 × 10⁻⁶	6.0 × 10⁻⁶	5.5 × 10⁻⁶	5.5 × 10⁻⁶	5.6 × 10⁻⁶	5.6 × 10⁻⁶	5.6 × 10⁻⁶
32-600 F	5.6 × 10⁻⁶	6.4 × 10⁻⁶	5.6 × 10⁻⁶	5.6 × 10⁻⁶	.....	.....	.....
32-1,000 F	6.4 × 10⁻⁶	6.7 × 10⁻⁶	6.4 × 10⁻⁶	6.4 × 10⁻⁶	.....	.....	.....
32-1,200 F	6.5 × 10⁻⁶	7.5 × 10⁻⁶	6.5 × 10⁻⁶	6.5 × 10⁻⁶	.....	.....	.....
32-1,832 F	.....	.....	7.6 × 10⁻⁶	.....	.....	.....	.....
Max. temp. without excessive scaling	.....	.....	1,250	.....	.....	.....	.....
Melting point range, °F.	2,700-2,790	2,700-2,790	2,700-2,790	2,700-2,790	2,500-2,750	2,500-2,750	2,500-2,700
Forging temp. Initial, °F.	2,000-2,200	1,950-2,050	2,000-2,200	2,100-2,300	1,900-2,200	1,900-2,150	1,900-2,100
Forging temp. Final, °F.	.....	.....	1,400-1,500	.....	.....	.....	.....
Forging temp. Method of cool	Retarded cool	.....	Slow cool	Retarded cool	Retarded cool	Retarded cool	Retarded cool
Annealing temp., °F. Low anneal	1,200-1,400	1,350-1,500	Air cool 1,200-1,400	1,200-1,400	1,350-1,450	1,350-1,450	1,350-1,450
Annealing temp., °F. Full anneal	Slow cool 1,500-1,650	.....	Slow cool 1,500-1,650	Slow cool 1,500-1,650	Slow cool 1,550-1,650	Slow cool 1,550-1,650	Slow cool 1,550-1,650
Hardening temp., °F.	Rapid cool 1,700-1,850	Not appreciably hardenable	Rapid cool 1,700-1,850	Rapid cool 1,700-1,850	Rapid cool 1,850-1,950	Rapid cool 1,850-1,950	Rapid cool 1,850-1,950

Data from AISI Steel Products Manual "Stainless and Heat Resistant Alloys" Section 24, April 1950 and from American Society for Testing Materials Special Technical Publication No. 52A, May, 1950.

How much better will Durcopumps do your pumping job?

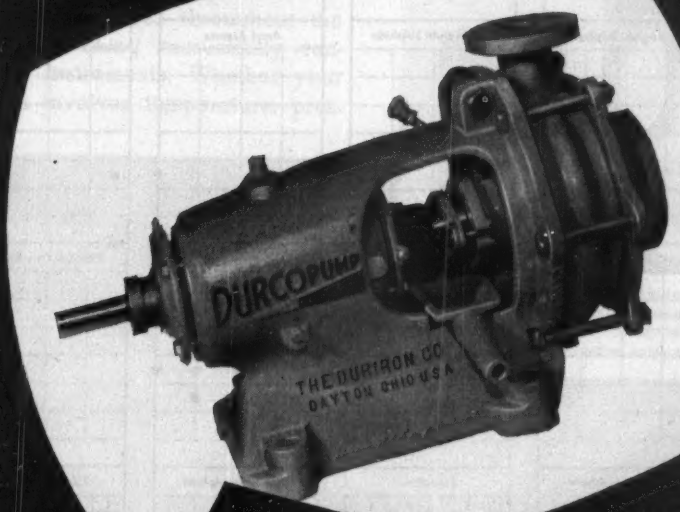
The Series R Durcopumps are engineered and built for heavy duty pumping with less maintenance. They're available as standard items in 12 alloys from our own foundry.

In many plants they're considered "standard equipment." *How much better* will they handle the corrosive you use?

Why not let us send you Durcopump Bulletin P/1? It will give you complete construction details and performance information to help you decide.

A DURCO representative near you will be happy to help you select the right pump in the right alloy.

WRITE OR PHONE FOR YOUR FREE COPY OF BULLETIN P/1

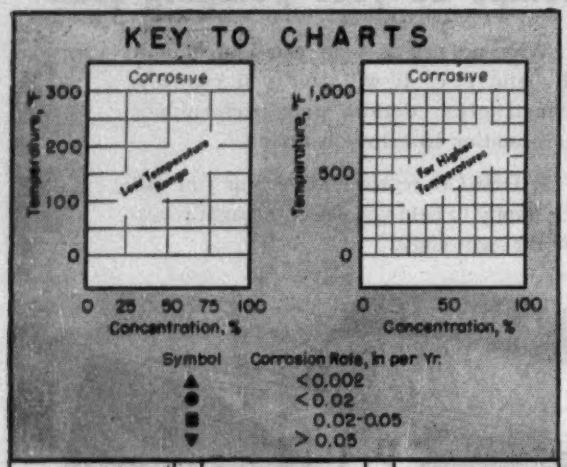


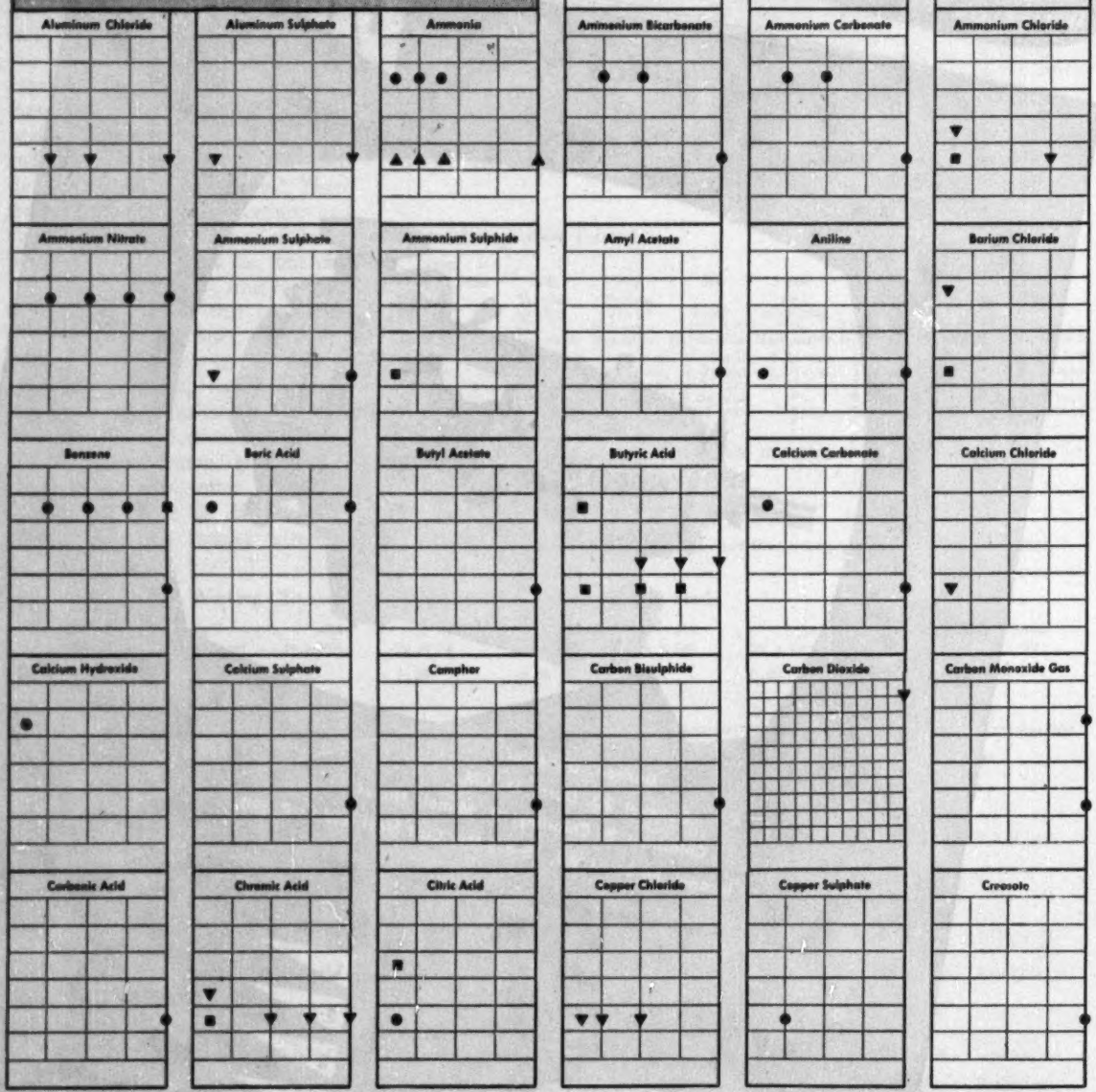
Duriron, Durichlor, Durimet 20, Durco D-10M, Chlorimet 2, Chlorimet 3, Monel, Nickel, Inconel, Ni-Resist #2, 18-8-S-Mo, Cast Steel and Cast Iron

1
2
3
4
5
6

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

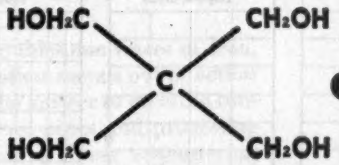
Corrosion Resistance of 12% Chromium Stainless Steels





(Continued on page 268)

HERCULES



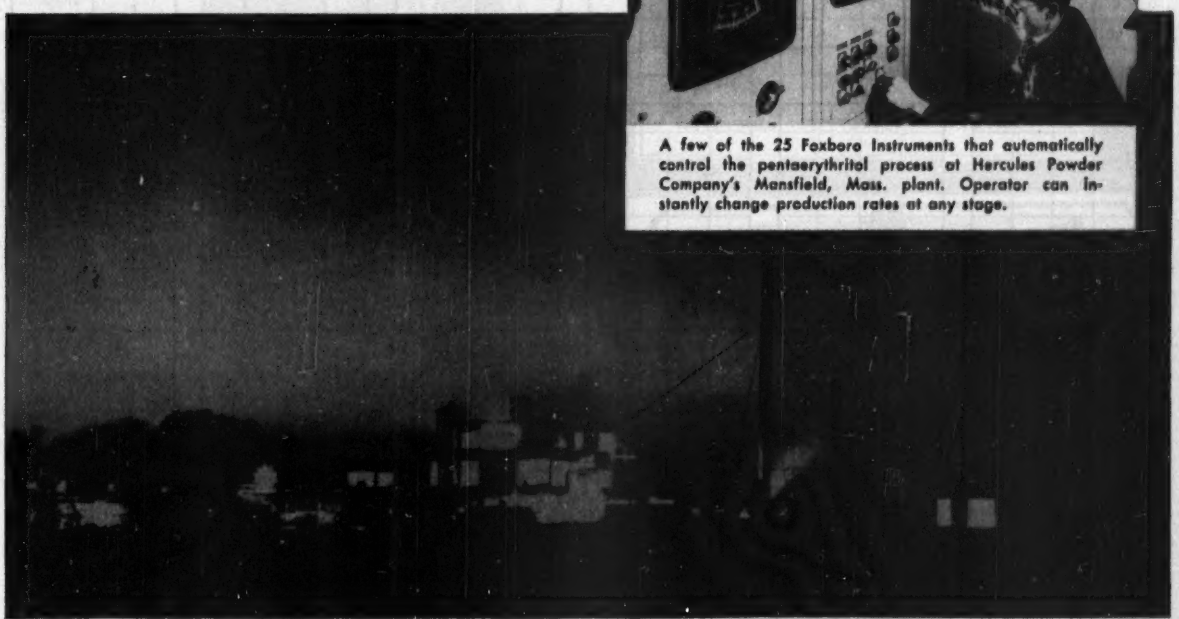
keeps quality uniform

...with FOXBORO Control

From the scale to the drier, Hercules Pentaerythritol is produced under "automatic" process control that makes uniform batches of this important Alkyd Resins Intermediate a certainty. At every stage of the process, Foxboro Controllers automatically hold temperature, pressure, and flow of reactants exactly as pre-set by the operator. And when production rates are reset, Foxboro control action swings smoothly, instantly to the new control points.

A wide variety of processes throughout the chemical industry are being successfully controlled by Foxboro Instruments. Whether your production problem involves temperature, pressure, flow or other process variables, Foxboro Control can help you get better product quality . . . efficiently. Write for engineering data covering your particular problem.

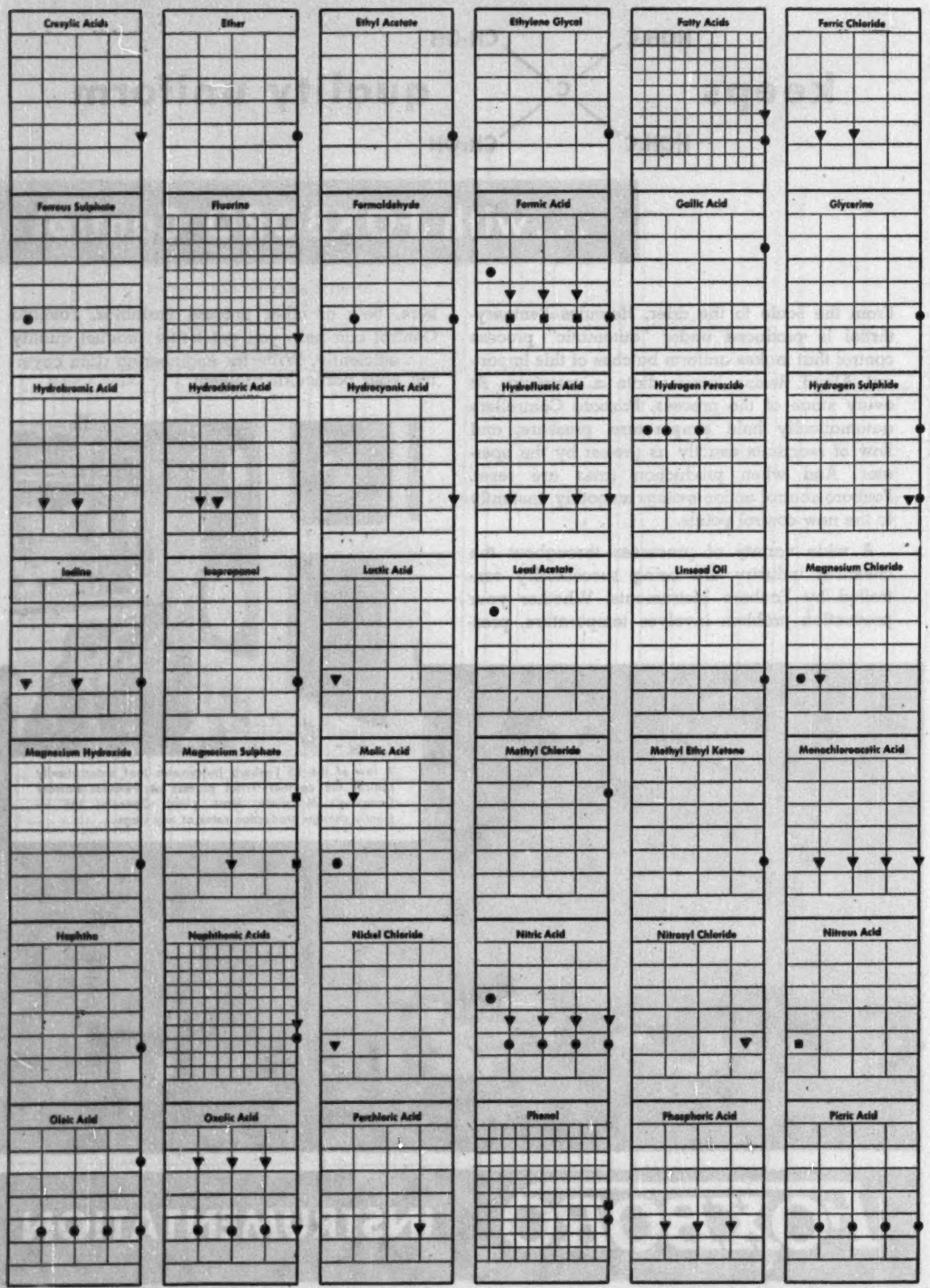
A few of the 25 Foxboro Instruments that automatically control the pentaerythritol process at Hercules Powder Company's Mansfield, Mass. plant. Operator can instantly change production rates at any stage.



FOXBORO REG U S PAT OFF **INSTRUMENTATION**

THE FOXBORO COMPANY, 367 NEPONSET AVE., FOXBORO, MASS., U.S.A. • FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Corrosion Resistance of 12% Chromium Stainless Steels



(Continued on page 270)

TAKE TRACE METALS OUT OF ACTION!

● Now you can take troublesome traces of iron, aluminum, copper and other metals out of action easily and effectively. The answer to metallic contaminants picked up from pipes and processing equipment is the use of a Pfizer sequestering agent . . . Gluconic Acid, Citric Acid or one of their derivatives.*

Pfizer Citrates and Gluconates are recommended as sequestering agents in:

The textile industry . . . to inactivate trace metals in dyeing, bleaching, kier boiling and mercerizing.

The leather industry . . . to adjust tanning solutions to the proper pH without precipitation.

Oil and fat industry . . . to inactivate trace metals which lead to rancidity.

Weed killer formulations . . . to prevent formation of insoluble, inactive salts in hard water areas.

Municipal and industrial water systems . . . to prevent the precipitation of metallic contaminants.

Bring your metallic contamination problems to Pfizer. Write for Technical Bulletin #32.

CHAS. PFIZER & CO., INC.
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.

*Sodium Citrate, Sodium Gluconate, Ammonium Gluconate

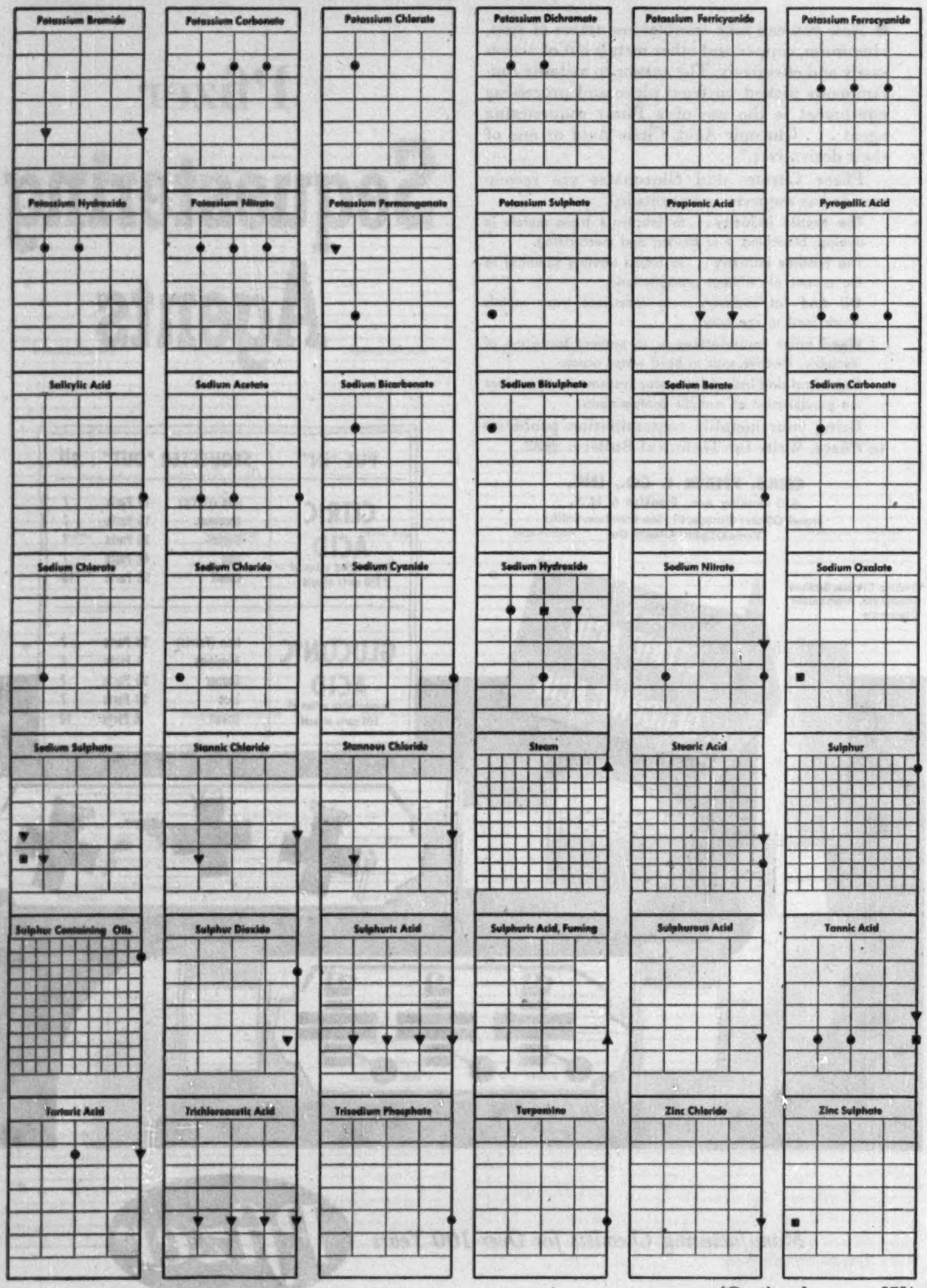
Pfizer
Sequestering Agents

PUT "IN"	SEQUESTER "OUT"		pH
CITRIC ACID Sequestering action of 100 parts of acid	Iron (Ferric)	19 Parts	7
	Aluminum	19 Parts	7
	Copper	28 Parts	7
	Zinc	44 Parts	7
	Cobalt	95 Parts	10
GLUCONIC ACID Sequestering action of 100 parts of acid	Iron (Ferric)	24 Parts	7
	Aluminum	4 Parts	7
	Copper	26 Parts	7
	Zinc	27 Parts	7
	Cobalt	8 Parts	10

Manufacturing Chemists for Over 100 Years

Pfizer

Corrosion Resistance of 12% Chromium Stainless Steels



(Continued on page 272)

IT PAYS ALL WAYS TO BUY FRUEHAUFS!

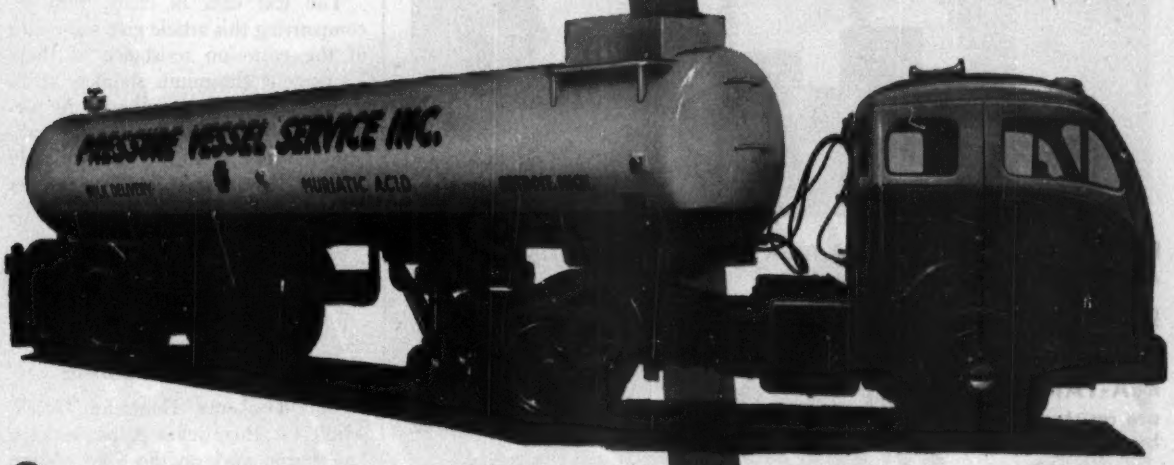
Full Value For Your Money

All The Features You Need

ost Dependable Performance

reatest Operating Economy

ost Experience Building Chemical Vessels



F. A. Nicholson, Manager of Pressure Vessel Service, Inc., of Detroit, says this about his company's new 3800-gallon Fruehauf Tank-Trailer, used for hauling muriatic acid to industries in the Detroit area: "Although Fruehauf's price for this unit was not the lowest, the Trailer was designed to meet *all* our hauling problems and needs. Our purchase was influenced by the integrity of the Fruehauf name, and the convenience of Fruehauf Factory Branch Service." The unit is frameless, and rubber-lined, with an outside coating of corrosion-resistant Epoxyn.

BUYING ANYTHING AT ALL brings up the question: "How do I get the best value?" Lowest price and greatest value seldom get together. When you buy a Trailer, for example, make sure its features measure up to your hauling needs. When comparing prices, be sure to compare specifications, too.

We think that, comparing "specs," you will always decide on Fruehaufs. That's because Fruehauf gives haulers *more value* in a Trailer than anyone else possibly can. Fruehauf has the world's most extensive facilities for low-cost, high-quality Trailer production. These savings are handed on to you, along with a Trailer that will do your job, do it best, and do it most *economically*.

Fruehauf has a full line of Tank-Trailers that includes a specially-engineered unit for every type of liquid chemical. For worthwhile hauling savings, for *full* Trailer value, call your nearby Fruehauf Branch soon, or write for the free Tank-Trailer Catalog. If you are not already using Trailers, a Fruehauf salesman will be glad to estimate your possible transportation savings in a free "Transportation Cost Analysis" of your business.

World's Largest Builder of Truck-Trailers

FRUEHAUF TRAILER COMPANY

DETROIT 32, MICHIGAN

FRUEHAUF TRAILERS

"ENGINEERED TRANSPORTATION"

FUME STACKS of PLA-TANK®

Day by day, more and more PLA-TANK Stacks go to work helping to solve corrosion problems.

PLA-TANK STACKS
are manufactured from long-life resin-bonded glass fiber.

PLA-TANK STACKS
are resistant to a wide variety of fumes and temperatures. Not affected by extremes in weather.

PLA-TANK STACKS
are light in weight, relieve danger of collapsing and sagging roofs; need less support. Save on handling, freight and shipping charges.

PLA-TANK STACKS
are easy to install, require less rigging.

PLA-TANK STACKS
are competitively priced with other corrosion-resistant materials.

PLA-TANK STACKS
are available now in diameters to 54".

PLA-TANK STACKS
are the answer to your needs for many fume exhaust jobs now on your drawing boards or for replacements in existing systems.

Write for free data file sheet

THE Chemical CORPORATION
61 Waltham Avenue, Springfield 9, Mass.

Typical Uses—12% Cr Stainless

Pump impellers and shafts, gland parts
Valve handles, valve bodies, stems, seats, inserts, plugs
Heat exchangers
Vacuum and pressure vessels
Bubble caps and trays
Storage tanks
Handling equipment for abrasive materials
Parts and screens, troughs, flumes, conveyor belts
Paper mill beater bars
Mixers, impellers, shafts, agitators, orifices
Liner materials to resist high temperature sulfur corrosion

are more resistant than the 12 percent chromium stainless alloys though slightly less resistant (despite their 16-18 percent chromium content) than the 17 percent chromium stainless steels to be discussed in the next article.

The test data in chart form accompanying this article give some idea of the corrosion resistance of these 12 percent chromium stainless steels to some common corrodents. As previously noted however, local conditions may change the picture drastically. The preceding charts should be used as rough guides only.

Corrosion charts for this article were prepared from "Corrosion Data Survey" by G. A. Nelson, copyright Shell Development Co., Emeryville, Calif.

Dechema M. of C. Tables

The Dechema Deutsche Gesellschaft für chemisches Apparatewesen has started work on the third edition of the Dechema Tables of Constructional Materials. These tables first appeared in 1937, and have proved to be a valuable aid to chemical engineers.

A great deal of ground was covered in the second edition, which appeared in 1948, but the new edition will go far beyond this. Not less than one hundred materials of construction of importance to the chemical equipment industry are dealt with. The behavior of each of these materials in the presence of 850 active chemical agents is indicated on individual sheets for each material. The prospectus of the third edition includes a comprehensive survey of this work. This prospectus may be obtained free of charge from the Dechema, Frankfurt/Main 13.

The first 50 to 100 sheets of the Dechema Tables of Constructional Materials are now available. Preparation of the complete third edition is expected to take two years. Price is DM. 0.30 for each sheet. The work

New BROCHURE!

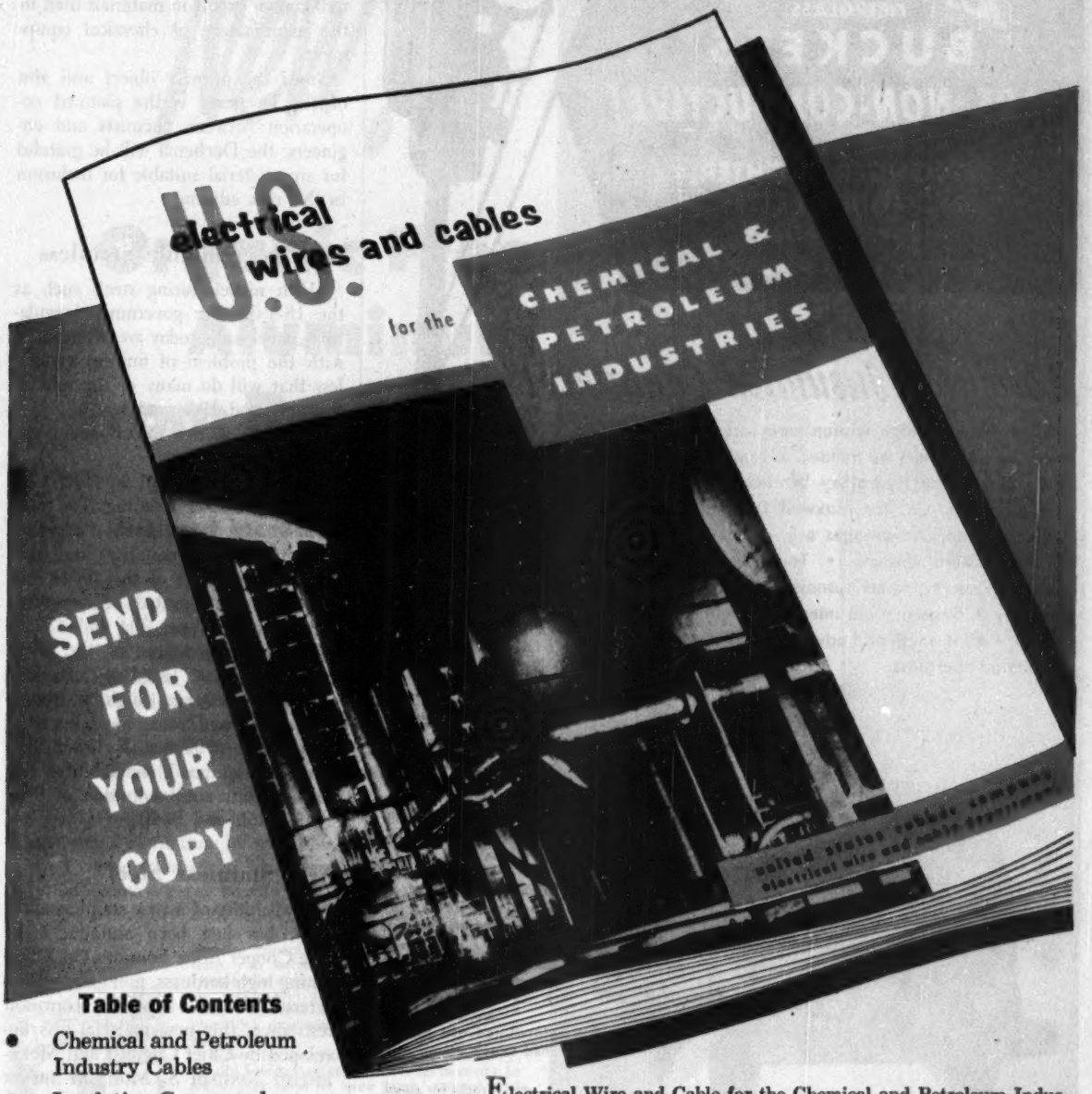


Table of Contents

- Chemical and Petroleum Industry Cables
- Insulation Compounds
- Jacket Compounds
- Portable Cables
- Power Cables
- Control Cables
- Telephone Cables
- Tables

Electrical Wire and Cable for the Chemical and Petroleum Industries must have the right chemical, oil and corrosion-resistant insulations plus the right electrical and physical properties for the job. Insulations and jackets which may be excellent for one type of service may be unsatisfactory in another. United States Rubber Company, a specialist in manufacturing the *right* electrical wires and cables for the Chemical and Petroleum Industries, is the only wire and cable manufacturer growing its own natural rubber, making its own synthetic and plastic insulations.

The brochure shown above shows what "U.S." wires and cables to order for specific applications. Write to address below for your free copy.

UNITED STATES RUBBER COMPANY

U.S. RUBBER

ELECTRICAL WIRE AND CABLE DEPARTMENT • Rockefeller Center, New York 20, N. Y.

THESE
LAMINEX
FIBERGLASS
BUCKETS
ARE NON-CONDUCTIVE!

STRONGER, LIGHTER,
SMOOTHER, BETTER—
yet costs less
than stainless steel

"Make us an Absolutely Insulated Container!"

Men at work on high tension wires are protected in man-size containers we molded of Laminex fiberglass for use with the Hydro-Sky Worker, made by Tey Manufacturing Co. for Maxwell Equipment Co. of Milford, Conn. Advantages are — Non-conductivity • High flexural strength • Toughness • Non-corrosiveness • Imperviousness to weather and humidity • Super-smooth interior • Light weight • All strength and advantages of laminated fiberglass.

OTHER LAMINEX PRODUCTS IN REGULAR PRODUCTION

Tanks to facilitate handling materials throughout industry — fabricated, or one-piece molded by Laminex patented process.

Round containers to replace stainless steel, monel, ceramic, glass-lined and rubber-lined vessels for all uses.

Trucks for clean, easy materials handling in textile, chemical, dyeing, foodstuff and other fields.
Also, hoods, vents, ductwork, buckets, sheets, etc.

Custom molding and fabricating to your exact requirements. Without obligation, let us show you how hundreds of problems can readily be solved with Laminex (patented) molded fiberglass.

LAMINEX CORPORATION
994 Jefferson Street, Fall River, Mass.

Write for Free Laminex Data Sheet or to have a Laminex Representative advise you. No obligation!

will contain the fruits of 20 years' combined work and research by the Dechema and Dr. Erich Rabald, well-known expert in materials used in the manufacture of chemical equipment.

Since the primary object and aim of the Dechema is the planned cooperation between chemists and engineers, the Dechema will be grateful for any material suitable for inclusion in this new edition.

Readily Available Stainless

With nickel-bearing steels such as the 18-8's under government regulations, steel users today are often faced with the problem of finding a stainless that will do many of the jobs of the restricted 18-8 grades.

One step in this direction is Type 443 stainless.

In a folder put out by The Carpenter Steel Co., Reading, Pa., now available to steel users, Carpenter compares the workability and mechanical properties of this Type 443 at room and elevated temperatures with those of Types 304 and 430.

Principal advantages of the Type 443 stainless are listed as: excellent corrosion resistance, high resistance to scaling conditions, low annealing temperature (500 deg. F. lower than Type 304), good workability and machinability similar to that of SAE 3145, 3250 and 4650.

New Stainless Steel

Availability of a new stainless alloy, V2B, has just been announced by The Cooper Alloy Foundry Co. Combining high hardness, non-galling characteristics and superior corrosion resistance, this new material was developed by Chief Chemist and Metallurgist, Norman S. Mott, in answer to the continued demand for a stainless steel which would not gall or seize in corrosive service.

V2B is a hardenable 18-8 type of stainless steel, containing copper, molybdenum, silicon and a very small amount of beryllium. It is readily machinable in the quench-annealed state, and may be hardened by a low temperature heat treatment which produces no distortion and only a light heat tinting discoloration, and which may be readily removed if necessary.

In the annealed condition, the ma-

New!

Organic Free Aluminum from Reynolds

Improve Your Products Without Increasing Your Cost

This new, snow-white premium grade of Aluminum Trihydrate is available at the same price you are now paying for commercial grades of aluminum trihydrate.

Whiter than any other similar product now available, Reynolds Organic Free Aluminum Trihydrate offers you an opportunity to make your present products better without increasing costs. Often you can actually cut manufacturing costs because this premium grade product requires no oxidizing agents to give you pure white end products.

For further information on the new Organic Free Aluminum Trihydrate, call the Reynolds Office nearest you, or write to Reynolds Metals Company, 2567 So. Third St., Louisville 1, Ky.

Special consulting service is available to help you solve your problems involving chemicals, shipping containers, processing, corrosion and construction—the staff of each Reynolds regional office includes a chemical engineer and other engineering specialists.

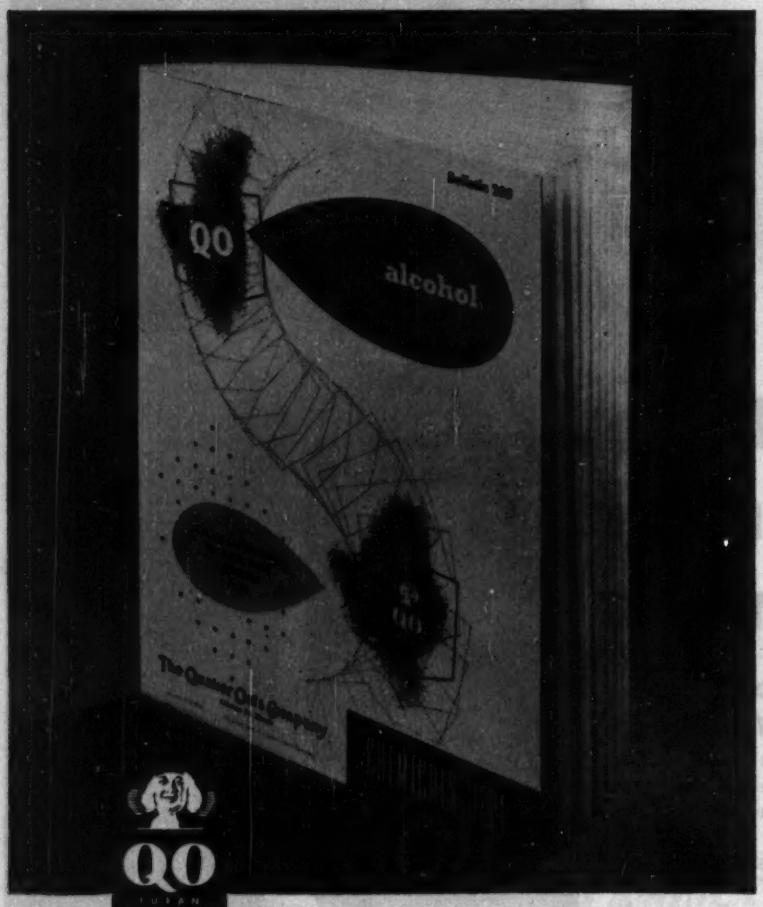
When further consultation is necessary, a fully integrated technical staff is ready to show you how to save time, money and labor with Reynolds chemicals, mill products and shipping drums.

NOTE: Standard Commercial and Low Iron Hydrates also available.

SEE *"Mister Peepers"* Sundays, NBC-TV. HEAR *"Fibber McGee and Molly"* Tuesdays, NBC radio. Consult local listings for time and station.

REYNOLDS CHEMICALS

FROM THE PRODUCERS OF REYNOLDS ALUMINUM



Find out where Furfuryl Alcohol fits into **YOUR** *picture*

Bulletin 205—just released—gives you useful information on commercial handling, physical data, chemical reactions and established uses of FA* furfuryl alcohol. Find out how FA can serve you efficiently and economically as a resin ingredient, as a wetting agent, reactive solvent and as a solvent for resins and dyes.

*Reg. U. S. Pat. Off.

The Quaker Oats Company
CHEMICALS DEPT.

WRITE TODAY FOR BULLETIN 205

335N The Merchandise Mart,
Chicago 54, Illinois
Room 535N, 120 Wall St., New York 5, N. Y.
Room 435N, P.O. Box 4376, Portland 8, Oregon

Please send me a copy of the new Bulletin 205, without obligation.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

terial is easily welded using special V2B welding rods. In addition to its use in a variety of corrosive applications, where its high hardness and non-galling features are required, V2B unlike other precipitation hardenable alloys, does not over-age at elevated temperatures. It may therefore be used safely in steam applications and at temperatures up to 1,400 deg. F.

Resistance of V2B in the hardened condition to sulfuric, hydrochloric and phosphoric acids and their salts, exceeds that of all precipitation hardenable alloys—even that of Type 316, the molybdenum bearing stainless alloy. In nitric acid it is also superior to the other hardenable grades, but not quite the equal of Types 304 or 316 stainless.

Its high hardness and strength, coupled with its excellent resistance to corrosives, plus its erosion resisting and non-galling characteristics, suggest many applications such as: valve disks, plug casings, wearing rings, poppets, conveyor links, rollers, gear blanks and other parts requiring both wear and corrosion resistance.

V2B may be produced readily in both the cast and wrought form, with the following balanced composition range considered best for the majority of applications:

Carbon	<0.07
Chromium	19.0 –19.5
Nickel	9.75–10.25
Silicon	2.75– 3.25
Copper	2.0 – 2.25
Molybdenum	3.0 – 3.50
Manganese	0.50– 0.75
Beryllium	0.10– 0.20

Typical hardness and mechanical properties of V2B produced to the composition shown above are as follows:

Hardness: (Brinell)	
As cast	302
Quench annealed	269
Annealed & hardened	363
Tensile strength	151,000 psi.
Yield strength	122,400 psi.
Elongation	3%
Reduction of area	2%

National Plastics Exposition

The Sixth National Plastics Exposition will be held the week of June 6, 1954 at Cleveland, Ohio, in the Cleveland auditorium. This plastics exposition is sponsored by The Society of the Plastics Industry, Inc., the trade and technical society in this field.

The plastics industry selected Cleveland from a group of fifteen cities particularly because of its excellent exposition facilities.

Elliott
FABRI-STEEL
MOTORS AND GENERATORS

Another big low-speed motor by ..... ELLIOTT

A large low-speed engine type synchronous motor with split rotor, for driving Ingersoll-Rand type PRE reciprocating gas compressor.

Close-up of the pressurized explosion-resisting collector ring enclosure.

This big motor is rated 2000 hp, 164-rpm, 4000 volts, 3 phase, 60 cycle, 50 C rise, 1.0 power factor. The split rotor facilitates assembly on the compressor shaft in the field. Collector rings are enclosed, adapting the unit to duty in explosive gas atmosphere.

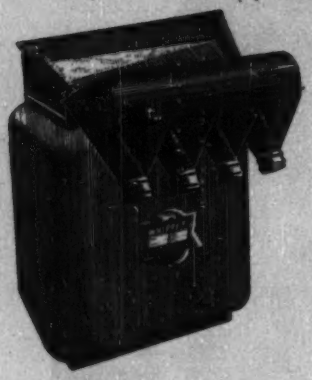
Elliott has established a particularly strong reputation in large motors designed for specific and individual conditions, such as the one illustrated here. An exceptional degree of rigid ruggedness is gained by the famous Elliott "Fabri-Steel" construction while high performance and endurance are assured by quality workmanship throughout.

For full details write for Synchronous Motor Bulletin PB5000-1.

R2-2

ELLIOTT COMPANY
Ridgway Division **Ridgway, Pa.**
Plants at: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES

Pocketsize Performance*



*22 in. x 25½ in.

. . . with big equipment accuracy . . . that's Sutton's new

Whippet V-80

Specific Gravity Separator designed especially for small lot operations!

Now for the first time in separating equipment history here is a portable lab-size separator, incorporating all the inherent performance qualities of standard size machines. Now for the first time you can *economically* assay products for accurate "commercial yield" data *before* setting up full-scale processing operations.

There's a lot you'd like to know about Sutton's new *Whippet V-80*. There's a lot we'd like to tell you.

Write Dept. C753

SUTTON, STEELE & STEELE, INC.
1031 SOUTH HASKELL • DALLAS, TEXAS

SALES AND SERVICE: DALLAS • ZELIENOPLE, PA. • NEW YORK • PITTSBURGH • CHICAGO MINNEAPOLIS • CLEVELAND • LOS ANGELES • SAN FRANCISCO • TWIN FALLS, IDAHO PRODUCTS: WINNIPEG CANADA • SAO PAULO BRAZIL • LONDON ENGLAND

SUTTON
STEELE &
STEELE INC

NOW! LATTICE BRAID* PACKING WITH TEFLON†

Heavy Teflon impregnation throughout
Choice of Canadian white asbestos or blue African asbestos
Unique LATTICE BRAID construction

An Exclusive GARLOCK Shaft and Rod Packing

LATTICE BRAID packing (a patented Garlock product) is braided through and through to give it strength, flexibility, resiliency, and long life. Teflon (a du Pont product) is unaffected by caustics, process liquids, solvents, acids or chemicals of any kind.

Garlock combines these two products by impregnating each strand of LATTICE BRAID asbestos packing with Teflon suspensoid. The result is a sturdy braided asbestos packing with a heavy, thoroughly distributed Teflon impregnation which is unaffected by the liquid being handled. This long-life packing has a low coefficient of friction, is non-corrosive and non-contaminating.

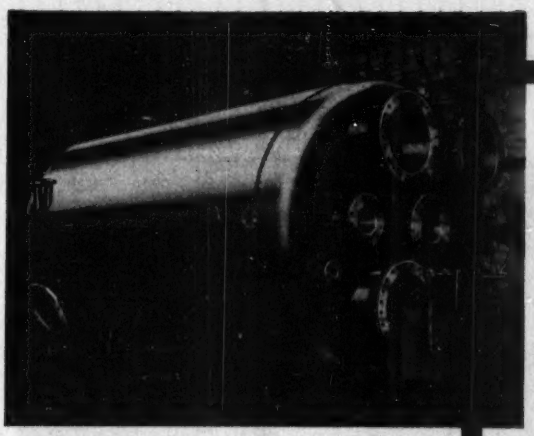
LATTICE BRAID with Teflon is available in either Canadian white asbestos (Style 5861) or blue African asbestos (Style 5880). Garlock also manufactures all-Teflon LATTICE BRAID packing, plastic packings of shredded Teflon, and other Teflon products.

For complete information, write us or contact your Garlock representative.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.
Branch Offices in Most Principal Cities

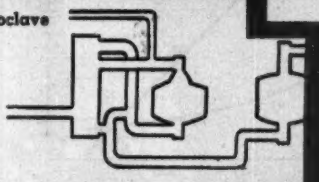
*REGISTERED TRADEMARK
†The Du Pont Company's Trademark

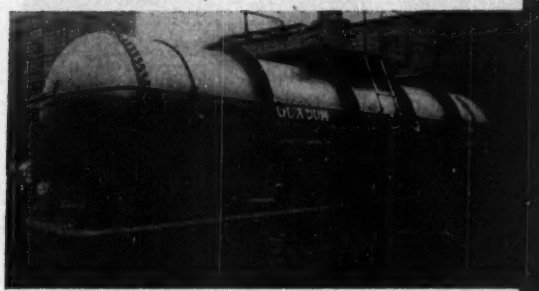
GARLOCK
PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS



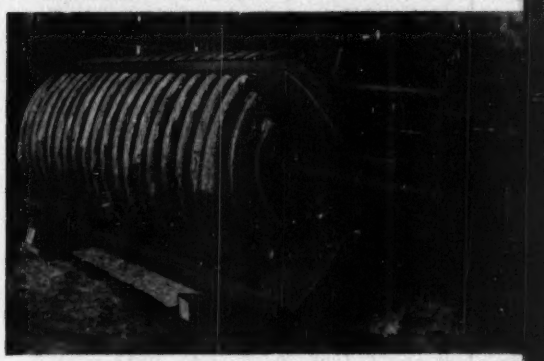
Lead Lined Jacketed Autoclave

when flow sheets call for "LEAD LINED"





Lead Lined Tank Car



Lead Covered Copper Coils

Make early contact with Treadwell where 40 years fabricating experience goes into your equipment

● HOMOGENEOUS LEAD LINED EQUIPMENT

By a special lead bonding process a layer of lead is bonded to the steel plate to form a homogeneous or integral metallic structure. The lead bonded plates are then fabricated into the desired equipment with all interior seams and joints being "hand-burned" to produce a continuous bonded lead interior.

Homogeneous lead lined equipment is recommended for corrosion resistant service where moderate fluctuating temperatures, vacuum, or vibration and physical shock are encountered, and where maximum heat transfer is important.

● "SHEET-LEAD" LININGS

For use where operating conditions are not as severe, Treadwell can fabricate and furnish equipment with sheet lead linings securely fastened to the vessel or equipment.

● LEAD COVERED COPPER COILS

Because extruded lead pipe coils lack rigidity for many heating operations and can only be operated at low steam pressure, the homogeneous bonded lead covered copper pipe coils has found a wide use in the process industries. Treadwell has available stock lengths of lead covered copper pipe and can design and fabricate coils to meet your requirements.

● OTHER LINED PRODUCTS

Conditions of corrosive service will require the use of various materials. Treadwell is equipped to supply other corrosion resistant linings as required by your process.

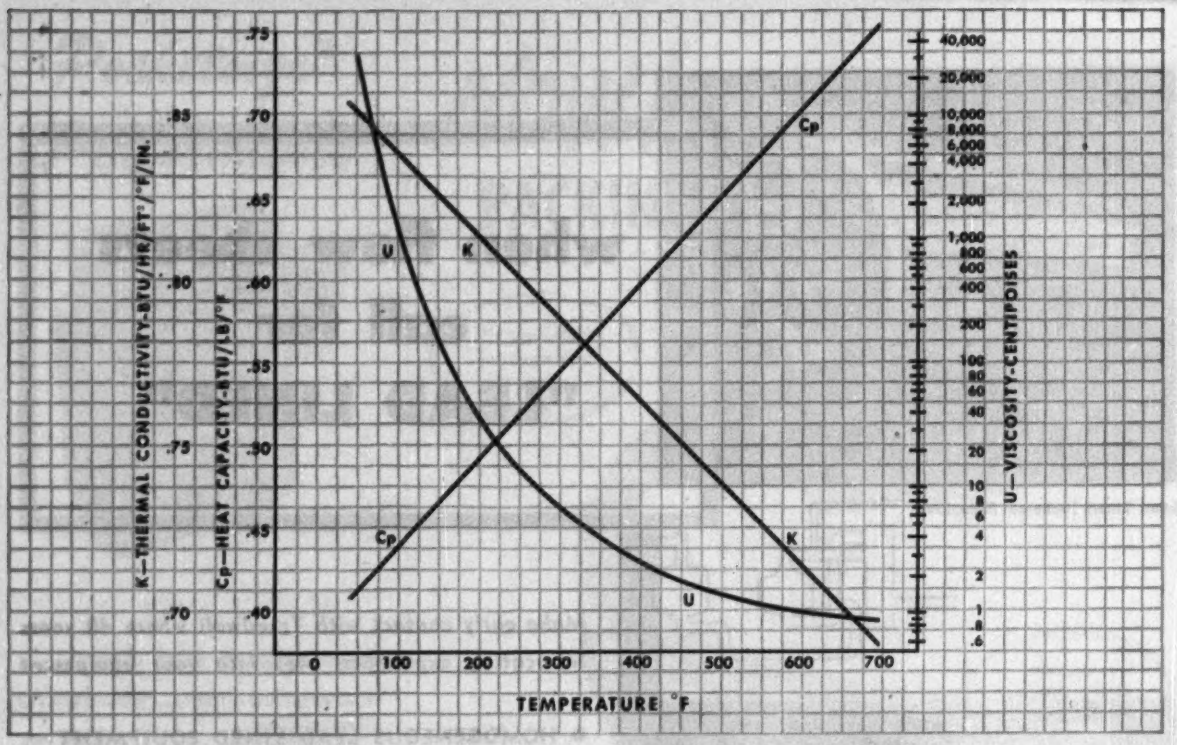
WRITE FOR FREE BULLETIN L-52 "CORROSION RESISTANT LINED EQUIPMENT."

TREADWELL

CONSTRUCTION CO.

PITTSBURGH • NEW YORK • CHICAGO

Plant and Main Office: Midland, Penna.



Thermal properties of Circo XXX Heavy Heat Transfer Oil are indicated as follows: thermal conductivity (K); heat capacity (Cp); viscosity (U).

WHY IS CIRCO XXX HEAVY AN EXCELLENT HEAT TRANSFER MEDIUM

for temperatures as high as 600 F?

because:

1 Its high thermal conductivity assures fast, efficient heat transfer to the process material

2 Its high heat-carrying capacity assures maximum efficiency over its entire operating temperature range

3 It doesn't form hard carbon deposits, which reduce heat transfer efficiency

4 Its low vapor pressure and high initial boiling point prevent pressure buildup

5 Its viscosity is low enough to permit easy circulation with any pump used in an oil-type heat transfer system

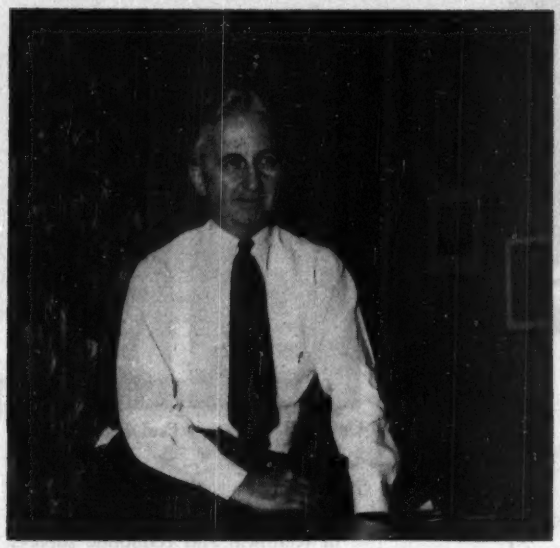
Other important properties of Circo XXX Heavy Heat Transfer Oil

Viscosity, SUS at 210 F	145-155
Gravity, Specific	0.94-0.96
Acidity	neutral
Carbon residue	0.5 max
Demulsibility	good
Initial boiling point	approx 860 F
Vapor pressure at 600 F	nil

For more information about heat transfer oils and systems, send for "Circo Heat Transfer Oils." Write SUN OIL COMPANY, Philadelphia 3, Pa., Department CE-7.

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY
SUNOCO®
PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

Names in the News



Man of the month:

Allen Abrams

IRI's new president lives up his theory, "Industrial research involves responsibility far beyond the laboratory."

In Allen Abrams the Industrial Research Institute has chosen as its president a man whose whole career attests an unflagging interest in research. He has been associated with Marathon Corp. since 1926, first as technical director and now as vice president in charge of research and the chemical division. During this association Marathon has evolved from just another paper company to an outstanding specialist in the manufacture of food packaging materials. The company's top management awards the research department much of the credit for this change of emphasis.

Research in industry was relatively new in 1926. But Abrams had been exposed to the subject during his earlier years at MIT. Actually, he backed into the profession. As the middle member of a western Pennsylvania family of nine children, he intended originally to be a doctor of medicine, then shifted and was graduated from Washington and Jefferson College as a civil engineer. Having his heart set on MIT, he took three years off to teach high school science, where he developed an interest in chemistry and earned enough money to pay his way through Tech.

Graduated in a combination course of chemistry and chemical engineering, Abrams taught a year at MIT, then started his paper making career as the first chemist for Bemis Bros. Bag Co. He was a member of the newly formed Chemical Warfare Service in World War I. During this period he met the lady who was later to become his wife, and he remarks every once in a while that at least there was one good thing which resulted from the war.

Abrams joined up with the Mead Corp. in the early investigation of the bleaching of southern kraft. In 1921 he became chief chemist of the Cornell Wood Products Co. Five years later he moved to the Marathon Corp. in charge of research, where he became vice president in 1940 and a director of the company in 1943.

Upon the death of his associate, Guy Howard, Abrams assumed complete responsibility for the program of developing spent sulfite liquor utilization, a field in which Marathon has pioneered for 26 years. Under his management the chemical division has expanded until it is using all of Marathon's spent liquor, and is purchasing additional raw material on the outside. This division produces a variety of materials, ranging all the way from a component of oil well drilling muds to the flavoring compound vanillin.

As a member of numerous scientific, technical and civic groups, Abrams has served, or is now serving, more than half of these as president, vice president or a member of the governing board. In 1947 he was voted by the Chicago section of the American Chemical Society as one of the ten ablest industrial chemists in the United States, and recently he was awarded an honory engineering citation by the University of Wisconsin. His interest in young people is attested by his holding high office in the YMCA, International Council of Religious Education, Boy Scouts and his local board of education. His active interest in politics stems from a profound belief in our enterprise system, and in furtherance of this cause he has served on city, state and national business groups and in the Republican party. His associates marvel at his ability to be in so many places at the same time, while doing a bangup job in every one of them.

Summing up his own philosophy Abrams believes that industrial research involves additional responsibility far beyond the laboratory. He thinks that research men should employ their special talents in civic and political affairs, in order that their brain children may be used properly. Hence the scientist and the engineer must learn to work with people, if they are going to accomplish the greatest good.

For all his busyness, Allen Abrams' life is by no means all work. Recreationwise, he sums up his enthusiasms as Research Project No. 1 (trout) and Research Project No. 2 (grouse). The numerical order is significant, since grouse may be hunted when trout are out of season. But trout are his real joy. From the first Saturday in May until early in September he is given to brief unexplained absences, from which he returns burned pink and looking unusually fit. When the trout refuse to take a fly, he goes back to more conventional research projects.

(*Continued*)

NEW LOW PRICES on BIN-DICATOR

world's simplest automatic bin level indicator. No springs, no motors, no lubrication. Watches and reports material levels in bins, silos, hoppers, chutes, etc.; automatically starts, stops filling machinery. Used throughout industry. Units installed 20 years ago still in use. Free catalog with valuable engineering data. Write:

THE BIN-DICATOR CO.

13946-D1 Kercheval Avenue • Detroit 15, Michigan

Produce MORE STEAM... in LESS SPACE... at LOWER COST! WITH

CYCLOTHERM* CYCLONIC COMBUSTION

• In thousands of installations, Cyclotherm Steam Generators set new standards for performance and economy. Exclusive Cyclotherm flame control produces 66% more power per sq. ft. of heating surface than competitive type boilers and requires only 3 sq. ft. of heating surface per Boiler Horsepower . . , saving up to ⅓ on installation space.

- Guaranteed 80% efficiency
- Complete on arrival. Only 4 easy connections
- Fully automatic controls
- Full power operation in 15 minutes

Cyclotherm Steam Generators are designed for 18 to 500 h.p., 15 to 200 psi operating pressures. Approved—ASME, Nat'l. Board Standards, Underwriters Laboratories, Inc.

*Reg. trade name Write for free catalog today. Dept. 30

CYCLOTHERM STEAM GENERATORS

NAMES IN THE NEWS, *cont.* . .

Donald B. Keyes. New York representative for Arthur D. Little, Inc., Cambridge, Mass. Has been director of research and development for the U. S. Industrial Alcohol and U. S. Industrial Chemical Cos., head of the chemical engineering division of the University of Illinois and a vice president and director of Heyden Chemical Corp.

Donald B. Keyes

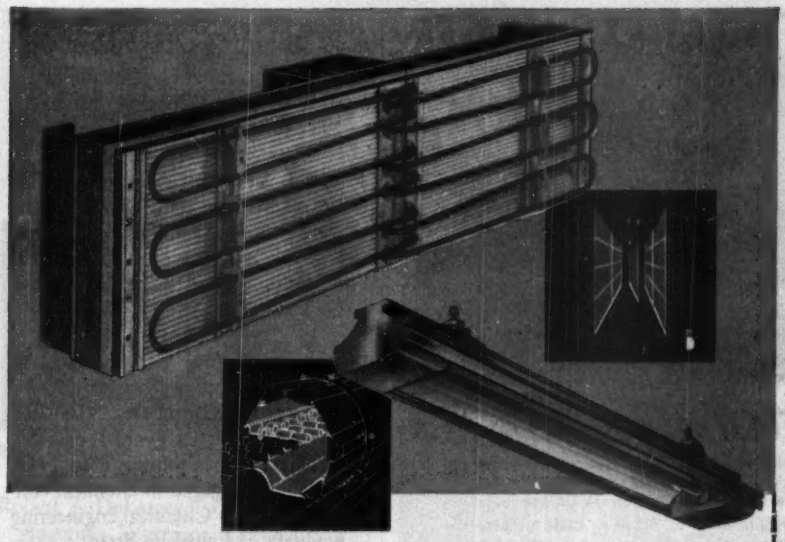
Paul Ferencz

Paul Ferencz. Consulting chemical engineer, Montreal. To specialize in technical and economic surveys, plant design, process development, statistical analysis. For the past 14 years, with Canadian Industries Ltd. in its research and development department.

Wendell R. Mullison. Assistant technical director of Dow Chemical Inter-American Ltd. For the past seven years, plant physiologist with Dow's agricultural chemical research department in Midland, Mich. Doctorate from the University of Chicago.

Robert M. Adams, Leonard L. Millar, David K. Whittington and **Arthur J. Zabinski** Production supervisors for Chemestrand Corp.'s integrated nylon manufacturing center now under construction near Pensacola, Fla. Mr. Adams has been a chemical engineer with Bakelite. Mr. Millar's previous employers: General Chemical Co.; American Viscose Corp. Mr. Whittington has been a fellow for two years at North Carolina State College. Mr. Zabinswi has been an engineer with Hooker Electrochemical Co. and Speer Carbon Co.

A. W. Davison. Consultant in chemical engineering and technical personnel management, Newark, Ohio. His previous career: head of the department of chemical engineering, Rensselaer Polytechnic Insti-

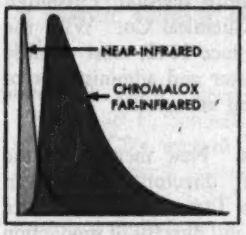


CHROMALOX *Far-infrared*

solves hundreds of heating problems

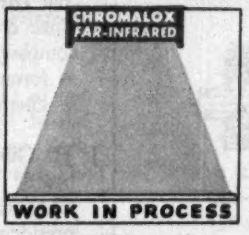
Here's your quick, economical and easy solution for curing, drying, degreasing, dehydrating, baking and other heating jobs. Pre-engineered Chromalox Units make oven building as simple as A-B-C, generate uniformly absorbed far-infrared heat for a multiplicity of processing needs. Temperatures up to 700° F are easily selected, accurately maintained. Low initial cost, low write-off cost, low operating cost!

ONLY CHROMALOX GIVES YOU ALL THESE ADVANTAGES



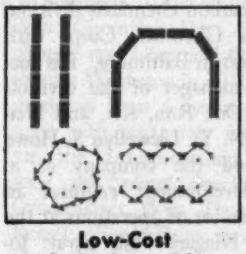
Color Blind Radiation

Longer far-infrared wave lengths are absorbed efficiently by all colors and textures.



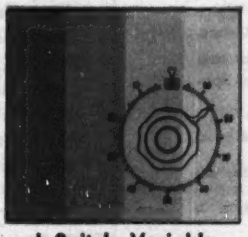
Heat Without Hot or Cold Spots

Chromalox radiant energy goes to work in a uniform pattern to span widest conveyor.



Low-Cost Oven Assembly

Pre-engineered Chromalox units require minimum expense to erect into complete ovens.



Infinitely Variable Heat Output

Heat from 0 to 100% of capacity to fit the exact temperature needs of the work.

plus

- **SHATTERPROOF CONSTRUCTION**—nothing to break or contaminate the work in process.
- **NON-DIMINISHING OUTPUT**—with all-metal Chromalox tubular far-infrared generators.
- **HIGH INTENSITY RADIATION**—with top BTUs per square foot.
- **QUICK HEAT-UP**—with energy transformed instantly into heat on the work.
- **ADDITIONALLY SAFE**-for any work involving volatiles.
- **MINIMUM MAINTENANCE**—Because of metal-sheathed, shock-resistant, long-lasting Chromalox tubular generators.

CHROMALOX *Electric Heat*
FOR MODERN INDUSTRY

DATA SHEETS

available to you on APPLICATIONS OF CHROMALOX RADIANT HEAT

ABRASIVES
- ☐ R-111: Drying Silicon Carbide Discs
- ☐ R-122: Drying Abrasive Cloth

ASPHALT
- ☐ L-1055: Melting Korite Sealing Compound
- ☐ R-105: Heating Asphalt to Improve Sealing of Batteries
- ☐ RP-203: Drying Asphalt Tile

AUTOMOTIVE
- ☐ R-126: Drying Tractor Parts
- ☐ R-118: Baking Synthetic Enamel on Gasoline Engines Also see; Paint Baking

BATTERY
- ☐ R-105: Heating Asphalt to Improve Sealing of Batteries

BOTTLING (see Glass)

CERAMICS
- ☐ R-115: Drying a Water-Base Glaze on Ceramic Tile
- ☐ R-134: Preheating Dinnerware to Prevent Warping
- ☐ R-137: Drying Pottery

CHEMICALS (see Plastics)

COMFORT HEATING
- ☐ L-1077: Keep Men Warm, Keep Work on Schedule
- ☐ R-114: Comfort Heating for a Foundry Worker

DEGREASING
- ☐ R-116: Vaporizing Oil from Sheet Metal Parts Also see; Paint Baking

DRUGS (see Glass)

ELECTRONICS
- ☐ R-109: Drying Cement Base in Television Tubes

FINISHES (see Paint Baking, Degreasing)

FOUNDRY
- ☐ L-1060: Skin Drying of Molds
- ☐ L-1085: Core Drying
- ☐ L-1096: Shell Molding Goes Automatic
- ☐ R-113: Comfort Heating for The Foundry Worker
- ☐ R-130: Drying Precision Plaster Molds
- ☐ R-135: Shell Molding

GLASS
- ☐ C & R-2: Sterilizing & Preheating Bottles
- ☐ R-127: Heating Television Tubes to Bake Interior Graphite Coating

PAINT BAKING
- ☐ L-1064: Drying Lacquered Metal Parts
- ☐ L-1065: Improves Enamel Baking Five Ways
- ☐ L-1066: Bakes Big Parts or Small, Fast or Slow
- ☐ L-1080: Baking Paint on Radiators
- ☐ R-118: Baking Synthetic Enamel on Gasoline Engines
- ☐ R-119: Baking Paint on Metal Awnings
- ☐ R-131: Baking Paint on Meter Parts
- ☐ R-138: Drying Ink and Paint on Toothpaste Tubes

PAPER
- ☐ R-134: Drying Glued Paper Sheeting

PLASTICS
- ☐ L-1086: Drying Vinyl Coating on Imitation Leather
- ☐ L-1091: Post-Forming Formica
- ☐ R-101: Molding Kapok Center for Softballs
- ☐ R-102: Drying Plastic Powders
- ☐ R-104: Preheating Micarta Strips for Punching
- ☐ R-121: Dehydrating Vinyl Sheets
- ☐ R-123: Drying Plastic Laminates
- ☐ R-128: Curing Plastic Coating on Spring Clips
- ☐ R-129: Fusing Vinyl to Chip Board
- ☐ R-132: Embossing Vinyl
- ☐ RP-210: Heating Plexiglas for Vacuum Forming
- ☐ RP-202: Heating Thermoplastic for Vacuum Forming

PRINTING
- ☐ L-1090: Silk Screen Process Drying
- ☐ R-103: Static Removal
- ☐ R-107: Drying Ink on a Miehle Vertical Press
- ☐ R-108: Ink Drying on 8-Unit Web-Fed Offset Press
- ☐ R-110: Eliminating "Offset" on Duplicating Machines
- ☐ R-124: Drying Ink on a Goss Press
- ☐ R-136: Silk Screen Process Drying

REFRIGERATION
- ☐ L-1055: Dehydrating Refrigerator Coils

RESTAURANT
- ☐ Far-Infrared Food Warmer

RUBBER
- ☐ L-1056: Curing Latex Foam Sponge Rubber
- ☐ R-125: Cementing Crepe Rubber to Wooden Soles

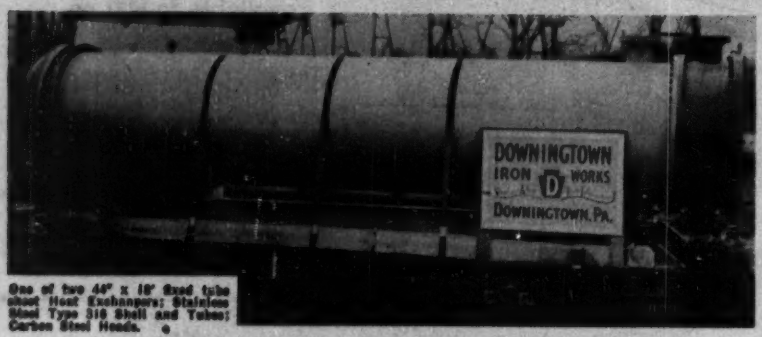
TEXTILES
- ☐ L-1068: Fusing Vinyl to Cloth Work Gloves
- ☐ R-112: Dehydrating Braiding Material

EDWIN L. WIEGAND CO., Radiant Heating Div.
7514 Thomas Blvd., Pittsburgh 8, Pa.

☐ Send me application reports I have checked.
☐ Have a Chromalox Application Engineer get in touch with me.

Name_____
Company_____
Street_____
City_____ Zone____
State_____ IC-71

and ANOTHER FINE HEAT EXCHANGER



One of two 44" x 18' fixed tube sheet Heat Exchangers; Stainless Steel Type 316 Shell and Tubes; Carbon Steel Heads.

ON ITS WAY TOWARD CUSTOMER SATISFACTION

. . . Yes, DOWNINGTOWN solicits your inquiry for Heat Transfer Equipment fabricated of Aluminum, Inconel, Nickel, Phosphor and Aluminum Bronze, Copper, Stainless, Monel, Silicon Bronze and various grades of Carbon Steel.

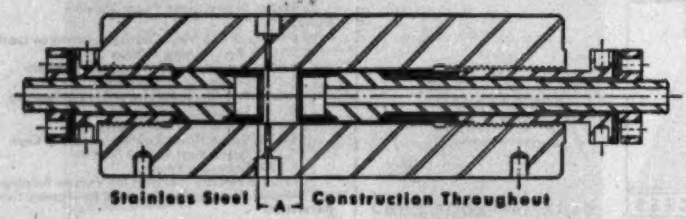
Design and construction will meet requirements of A.S.M.E. Code or other agency specified by customer. Equipment of our design is sold on a guaranteed performance basis or we will fabricate to customer's drawings. Modern facilities available for radiographing, stress relieving and heat treating, where required. Remember: "Your Needs are Our Specialty!"

DOWNINGTOWN is experienced in building equipment with Bi-metallic, Finned Tube and Karbate Graphite.

Write on your letterhead for DOWNINGTOWN literature on shell and tube heat exchangers.

DOWNINGTOWN IRON WORKS, INC.
DOWNINGTOWN-PENNA.
DIVISION OF PRESSED STEEL TANK COMPANY
Hackney
STEEL AND ALLOY PLATE FABRICATION AND HEAT EXCHANGERS

VISUAL OBSERVATION AT 30,000 PSI



This is a high pressure spectrophometric cell as used in the Applied Physics Laboratory of Johns Hopkins University. It is used for study of visible and near ultra-violet absorption spectra of liquids up to 2000 atm., 125° C. It measures optical densities of 0.1 to 1.0 photoelectrically to accuracies of 3%. The equipment is precise enough to detect a reversible wave length shift of 0.5 millimicron with pressure in the near ultra-violet spectra of toluene.

SOME FEATURES OF THIS EQUIPMENT:
1. Optically flat quartz windows—self sealing—easily cleaned and replaced.
2. Movable self sealing closures adjust window spacing from 1/8" to 1"; Volume 2 to 16 cc.
3. Glas-Col heating mantle or water bath maintain accurate temperature.

THIS VESSEL CAN ALSO BE USED FOR:
A. Static or continuous studies of flowing streams.
B. Phase change study.
C. Equilibrium and kinetic studies of liquid phase reactions.
D. Biological studies of organisms under pressure.
E. Control of liquid concentration in a continuous flow system.
F. Freezing points of liquid, etc.

AUTOCLAVE ENGINEERS, INC.
ERIE, PENNSYLVANIA
EXPORT DEPT. • 751 DREXEL BLDG. • PHILADELPHIA 6, PA.

NAMES IN THE NEWS, cont. . .

tute, 1921 to 1942; director of research, Owens-Corning Fiberglas, 1942 to the present.

Joseph J. Krajicek. New member of the engineering staff, Edwal Laboratories, Ringwood, Ill. Formerly with Armour & Co. Chemical engineering graduate of Iowa State College.

Gordon A. Cain. General assistant to the operating vice president, Westvaco Chemical Div. Has been on the division's general development staff since joining it in 1951. Previously engaged in chemical consulting work. Chemical engineering graduate of Louisiana State.

Gordon A. Cain

Alan S. Evans, Jr.

Alan S. Evans, Jr. Manager of the coal chemicals division, Pittsburgh Coke & Chemical Co. With the company since 1942, most recently as formulator and administrator of its chemical sales policy.

J. H. Gibbs. New member of the board of directors, Shawinigan Chemicals Ltd., Montreal. Vice president and director of production in the company's plants at Shawinigan Falls.

J. G. Woods. Director of operations the hydrocarbon chemicals division, Mathieson Chemical Corp. with headquarters in Baltimore. His successor as manager of the division plants at Doe Run, Ky., and Niagra Falls, N. Y.: **Llewellyn S. Howe** who joined the company as a process development engineer in 1951. Director of operations at the division's Niagara Falls plant: **Joseph E. Baker** who has been with the company since 1934.

W. A. Brown, Jr. President, International Acetylene Assn. President and general manager of the Liquid Carbonic Corp.

Mark Plunguian. Director of research, Southern Chemical Cotton Co., Chattanooga, Tenn. Previously head of wood pulp research at the Summit, N. J., central research laboratory of Celanese Corp. of America.

Mark Plunguian

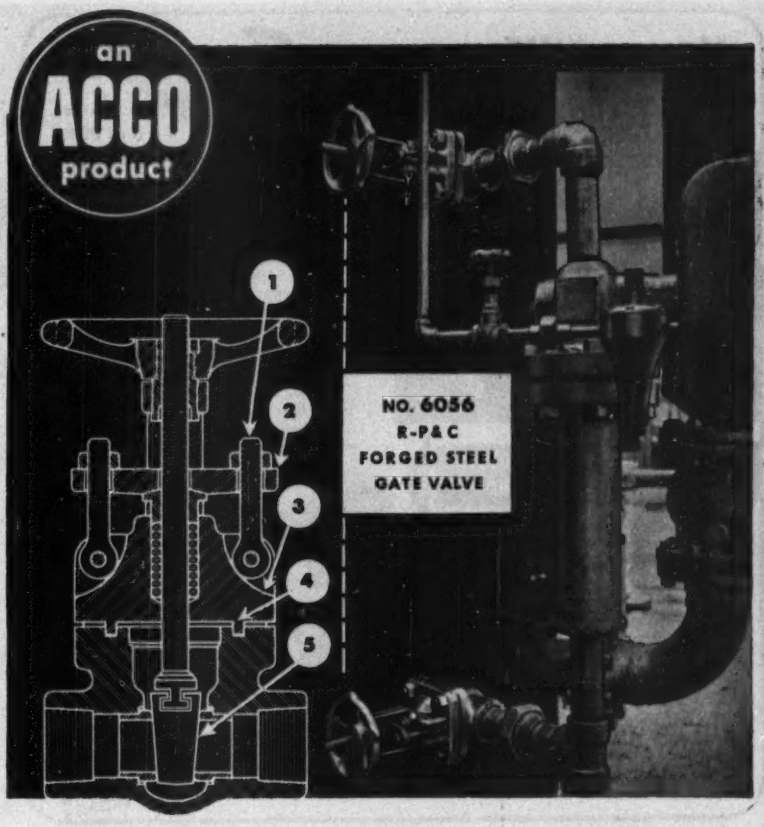
Robert J. DeLargey

Robert J. DeLargey. Director of engineering, Westvaco Chemical Div. Has been general assistant to the operating vice president. Came to Westvaco in 1951. Formerly assistant general manager of Grove Regulator Co., Oakland, Calif. Once superintendent of Shell Chemical's ammonia plant in Pittsburgh, Calif. Chemical engineering graduate of Case Institute of Technology.

Gustav Egloff. Honorary member of the Assn. Francaise des Techniciens du Petrole, Paris, France. Director of research, Universal Oil Products Co.

Emmette F. Izard. Recipient of the 1953 Jacob F. Schoellkopf Medal of the ACS's western New York section. Research associate with Du Pont since 1946. Cited for his discovery of polyethylene terephthalate. Joined Du Pont in 1929, as a research chemist. Doctorate in physical chemistry from MIT.

H. S. Sommers. Chief engineer, Westvaco Chemical Div., Food Machinery and Chemical Corp. Since joining Westvaco in 1950 Mr. Sommers has been assistant chief engineer with particular responsibility for the Intermountain Chemical soda ash plant development at Green River, Wyo. Previously with Pure Carbonic Corp. as manager of the carbon dioxide plant operation. Before that he was with Mathieson Chemical Corp., as project engineer and works manager for its magnesium-chlorine plant, Lake Charles, La., and then as chief engineer and assistant to the vice



1 Stainless steel bolts and nuts. 2 Two-piece gland and follower.
3 Bolted bonnet. 4 Tongue and groove joint.
5 Hardened wedge, chrome plated.

Why Gas Absorption Plant Chose These R-P&C Valves

● Because of the plant's isolated location the engineers felt they should standardize on a type of valve which could be used on different lines even though chemical solutions, temperatures, and pressures varied. The No. 6056 R-P&C Forged Steel Gate Valve proved to be the answer for several reasons.

First of all it has a pressure range from 380 lbs. at 1000° F., up to 2000 lbs. at 100° F. Then with its chrome stainless trim and chromium plated disc, it has high resistance to corrosion. On top of this, it's easy to service with its stainless steel gland bolts, and two-piece gland and follower.

Best of all, although the R-P&C Forged Steel Valve is premium quality it is NOT premium priced. It comes in sizes from ¼" to 2" with screwed or welding ends. If you use valves in these sizes, see your R-P&C distributor today or write our Reading, Pa., office for literature.

ACCO
R-P&C VALVE DIVISION
AMERICAN CHAIN & CABLE
Reading, Pa., Atlanta, Baltimore, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.
TRADE MARK

R-P&C valves

MODERN TIME AND COST SAVERS BUILT BY... Standard GRAVITY & POWER CONVEYORS

FASTER HANDLING IN SHIPPING ROOMS . . . With the HANDIBELT

Conveys bags, cartons, boxes horizontally or at any decline and incline angle within its range. Easily wheeled about by one man—easy to adjust and use — fits in crowded aisles, cars and freight elevators. Handles packages up to 135 lbs. TWO SIZES: No. 11 Handibelt, 11 ft. long, piles to 7 ft. 6 in.; No. 16, 15 ft. 9 in. long piles to 10 ft. 6 in. Write for HANDIBELT Bulletin — address Dept. CM-73

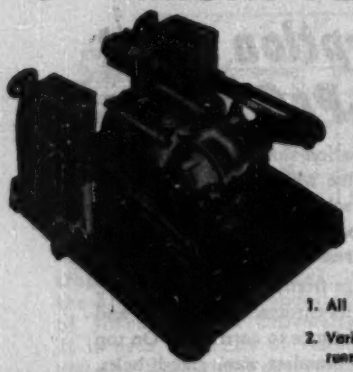
FASTER PILING IN WAREHOUSES with the HANDIPILER

For loading, unloading, stacking and elevating sacks, boxes, cases, and cartons. Adjustable boom reaches to rear of storage piles or far into cars, trucks, trailers. Reversible apron — conveys commodities up or down. Piles to 17 ft. — handles packages up to 100 lbs. Saves lifting — carrying — cuts handling time in half. Write for HANDIPILER Bulletin—address Dept. CM-73

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities.

Send for Standard Bulletin No. 63-B describing gravity & power conveyor units. Address Dept. CM-73.

New MICRO-FLEX CHEMICAL PROPORTIONING PUMPS



UNIQUE DESIGN
PATENT APPLIED FOR
OFFERS THESE IMPORTANT ADVANTAGES

1. All liquid in the cylinder is displaced at every stroke.
2. Variable delivery—stroke readily adjustable while pump is running. Locking nut maintains stroke adjustment.
3. Stroke adjustment indicating scale is stationary and legible while pump is running.
4. Stainless steel piston and cylinder assemblies for 7,500, 15,000 and 30,000 psi working pressures are interchangeable in the same pump frame. Simplex and duplex styles.
5. Piston reciprocated by positive mechanical linkage to crank arm—does not rely on return spring.
6. Check valves removed easily for cleaning or replacement.

AMINCO SUPERPRESSURE PRODUCTS
REACTION VESSELS
VALVES • FITTINGS
TUBING • PUMPS
COMPRESSORS
INSTRUMENTS
DEAD-WEIGHT GAGES
PILOT PLANTS
Described in Cat. 406-D

WRITE FOR BULLETIN 4061-D

SINCE 1919

AMINCO Superpressure Division
AMERICAN INSTRUMENT CO., INC.
Silver Spring, Maryland • In Metropolitan Washington, D. C.

NAMES IN THE NEWS, cont. . .

president, director of operations. Graduate of Case Institute of Technology.

H. Roger Coleman. Development director of R. S. Aries & Associates, New York. Previous employers: Evans Chemetics, Inc.; special products division of General Aniline & Film Corp. Yale graduate.

John R. Burkett. To manage the business of the Calco Chemical Div. in Canada, North American Cyanamid Ltd. Has been assistant to the manager, dyestuff department, since 1946. Joined Calco in 1935. Chemical engineering graduate of Iowa State College.

John R. Burkett

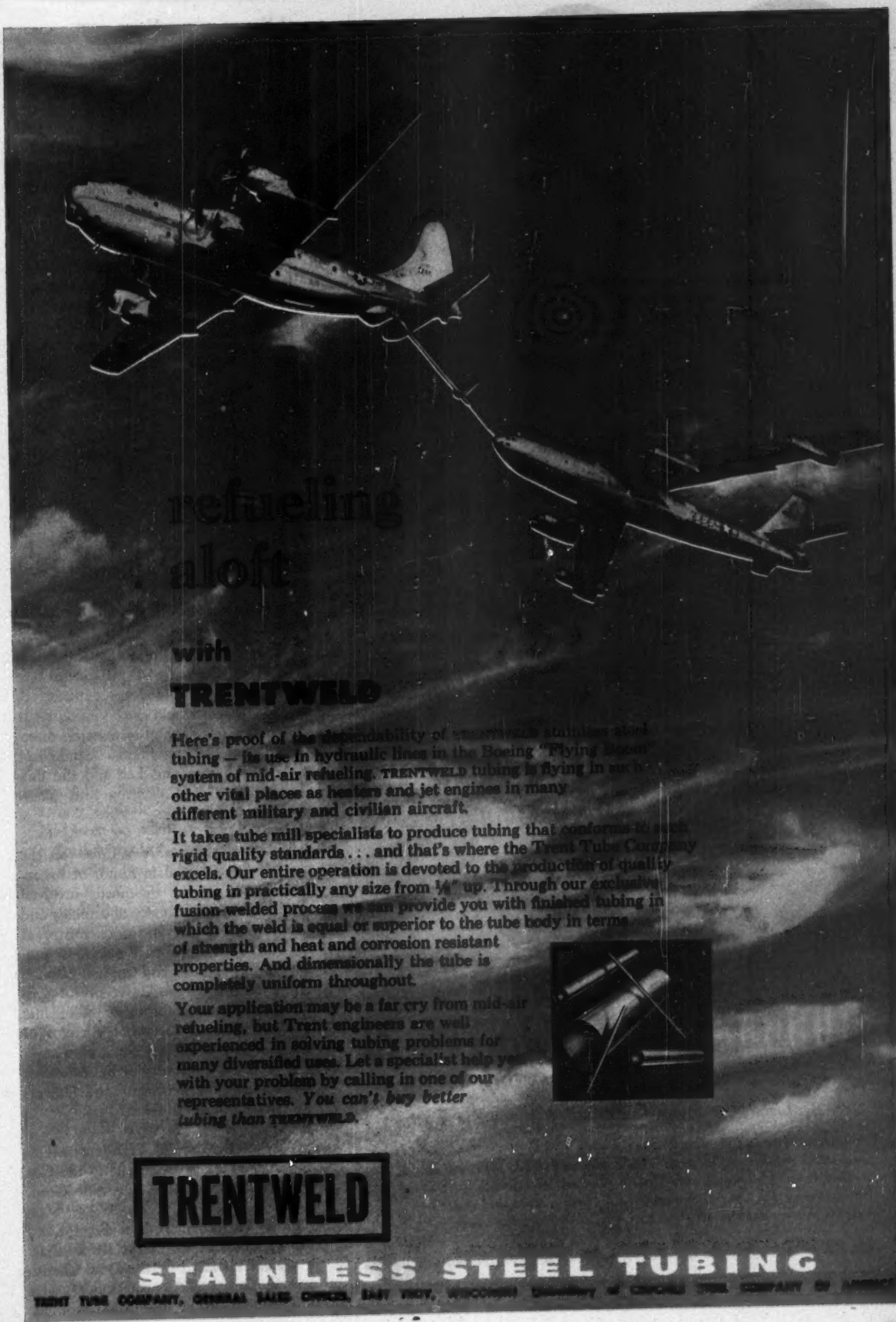
Henry H. Storch

H. H. Storch. Chief of the synthetic liquid fuels branch, Bureau of Mines. Longtime government synthetic fuels research specialist.

G. R. Cuthbertson. Assistant production manager, United States Rubber Co.'s tire division. Has been manager of the company's Los Angeles plant. Started with U. S. Rubber in 1936 as a research chemist.

Ray L. Farabee. Vice president, Delta Tank Mfg. Co., Baton Rouge, La. Has been vice president of the Central Foundry Co., Tuscaloosa, Ala. Prior to that, visiting professor and professor of chemical and metallurgical engineering at the University of Alabama and Purdue.

Webster N. Jones. Vice president in charge of industrial and government relations at Carnegie Institute of Technology. Has been dean of the college of engineering and science. Joined the faculty in 1932. One of the nation's leading authorities on synthetic rubber, thermoplastics and engineering education. With B. F. Goodrich Rubber Co. from 1919 to 1932; his last post there: general


refueling
aloft
with
TRENTWELD
Here's proof of the dependability of TRENTWELD stainless steel tubing — its use in hydraulic lines in the Boeing "Flying Boom" system of mid-air refueling. TRENTWELD tubing is flying in air b... other vital places as heaters and jet engines in many different military and civilian aircraft.
It takes tube mill specialists to produce tubing that conforms to such rigid quality standards . . . and that's where the Trent Tube Company excels. Our entire operation is devoted to the production of quality tubing in practically any size from ⅛" up. Through our exclusive fusion-welded process we can provide you with finished tubing in which the weld is equal or superior to the tube body in terms of strength and heat and corrosion resistant properties. And dimensionally the tube is completely uniform throughout.
Your application may be a far cry from mid-air refueling, but Trent engineers are well experienced in solving tubing problems for many diversified uses. Let a specialist help you with your problem by calling in one of our representatives. You can't buy better tubing than TRENTWELD.
TRENTWELD
STAINLESS STEEL TUBING
TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN

HASSALL SERVICE

SPECIAL NAILS RIVETS SCREWS

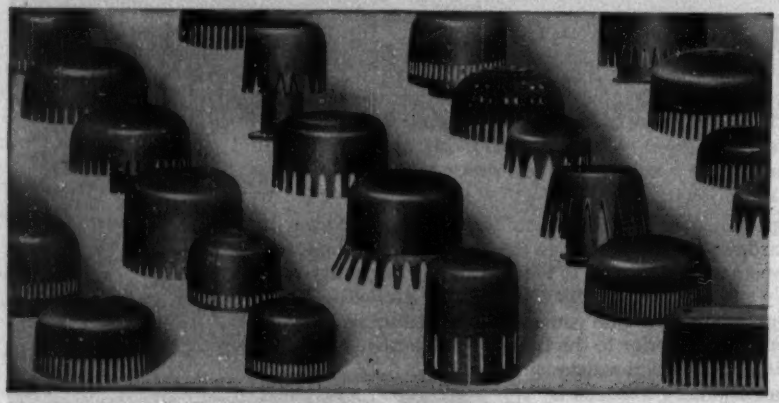
Hassall

ESTABLISHED 1850

Raw material inventory of Monel, Stainless Steel, Copper and Copper Alloys on hand. Send drawing—advise quantity. Free catalog on request.

JOHN HASSALL INC.

194 Clay Street, Brooklyn 22, N. Y.



SEND FOR PSC

BUBBLE CAP BULLETIN 21

Largest Compilation of Engineering Data.

Lists 200 Styles Furnished Without Die Cost.

This standard reference contains complete specification information for over 200 standard styles of bubble caps and risers. Also drawings for use in determining methods of tray assembly. All styles listed in Bulletin 21 are furnished promptly, without die cost, and in any alloy to meet your coking or corrosion problems. Special caps gladly designed; write us to your needs.

THE PRESSED STEEL CO., 707 N. Penna. Ave., Wilkes-Barre, Pa.

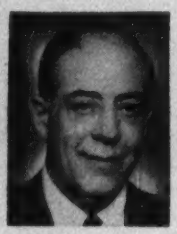
PSC

Custom Fabricators for the Process Industries Since 1928. Send Your Blue Prints

superintendent of the firm's processing division. Doctorate from Harvard.

Howard G. Wascher. President of Corn Industries Research Foundation. Chairman of the executive committee, Corn Products Refining Co.

S. S. Johnson. A vice president of the commercial development division of Mathieson Chemical Corp. Previous employers: M. W. Kellogg Co., Badger Process Div. of Stone & Webster. Graduate of Stevens Institute of Technology.



S. S. Johnson

C. W. Kaufman

Charles W. Kaufman. A director of Kraft Foods Co. Continues as vice president and director of research, posts he has held since joining Kraft in 1950. Previously research director for General Foods. Studied at Washington and Lee and the universities of California and West Virginia.

Robert Robinson. Winner of the Priestley Medal in honor of his research on the chemicals involved in the life processes of animals and plants. Professor of chemistry at Oxford. Some past positions: professor of pure and applied organic chemistry at the University of Sydney, Australia; professor of organic chemistry at Liverpool; director of research of British Dyestuffs Corp.; professor chemistry at St. Andrews, Manchester University and University College, London.

Thomas R. Moore. President, Metal Powder Assn. Assistant to the vice president, General Dyestuff Corp.

Lloyd M. Joshel. Budget director and technical expert at the Rocky Flats plant operated by the Dow Chemical Co. for AEC near Denver. Has been treasurer and a director for

Julius Hyman & Co. During the war he was a senior industrial specialist for the chemicals bureau of WPB. Previously a research chemist for the Dept. of Agriculture.

Manson Benedict. New member of the editorial advisory committee for the Chemical Engineering Series of McGraw-Hill texts and reference books. Professor of nuclear engineering, MIT, since 1951. Some previous positions: research chemist with M. W. Kellogg; head of process development for Kellex Corp.; director of process development for Hydrocarbon Research, Inc. Doctorate in physical chemistry from MIT. The McGraw-Hill advisory committee which Dr. Benedict now joins was organized in 1925 to lay the groundwork for a coordinated literature in chemical engineering. Its membership is made up of representative industrialists and educators.

Manson Benedict

Howard S. Bunn

Howard S. Bunn. Vice president, Union Carbide and Carbon Corp. Has been president of Bakelite Co., a Carbide division, since 1952. Also a director and president of Bakelite Co. (Canada), Ltd; a director of Bakelite Ltd. (England); a director and vice president of Canadian Resins and Chemicals Ltd. Joined Bakelite in 1922. Studied chemistry and chemical engineering at Lehigh University.

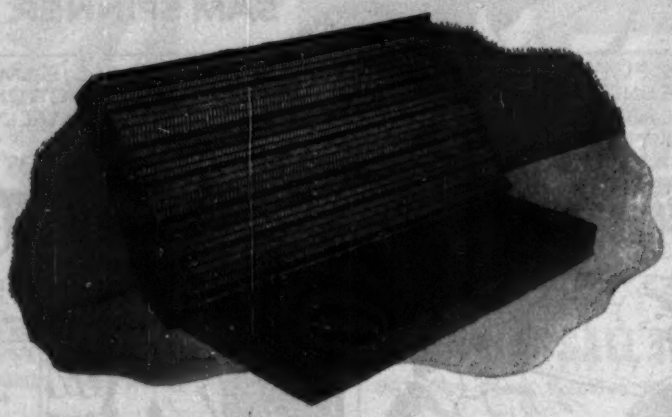
Robert Q. Parks. Manager of agricultural services of Grace Chemical Co. Previous employers: Ohio agricultural experiment station; U.S. plant, soil and nutrition laboratory at Ithaca, N. Y.; Dept. of Agriculture experiment stations at Auburn, Ala., and Beltsville, Md. Doctorate from Ohio State.

Kenneth S. Pitzer. To represent ACS on a committee to evaluate the National Bureau of Standards. Dean of the college of chemistry at the

WE TAMED EXPLOSIVE FUMES
with this centrifugal
AN A.T.&M. SUCCESS STORY BY SAM SPINNER
THE FUMES FROM THAT CHEMICAL ARE SO VOLATILE WHEN WE CENTRIFUGE IT, SAM, THAT JUST STATIC OR OVERHEATING WILL EXPLODE THEM!
I KNOW THE CURE FOR THAT!
BUT THAT'S NOT ALL, SAM! ANY METALLIC FRICTION WHICH WOULD NORMALLY TAKE PLACE IS DANGEROUS AND MUST BE ELIMINATED.
I CAN CURE THAT, TOO!
LATER
THE FUME-PROOF HOOD ON THIS STANDARD AT&M MACHINE WILL SEAL FUMES IN-TIGHTER THAN A DRUM. AND—
WE DEVELOPED A SPECIAL TWO-SPEED SELF-BRAKING MOTOR JUST FOR YOUR PARTICULAR PROBLEM WHICH COMPLETELY DOES AWAY WITH THAT FRICTION YOU WORRIED ABOUT. YOU'RE IN THE CLEAR—SAFE AND EFFICIENT!
FREE ILLUSTRATED BOOKLET
AMERICAN TOOL & MACHINE COMPANY
1415 Hyde Park Avenue, Boston 36, Mass.
Please send me my free copy of the new AT&M booklet "Centrifugal Force." I am interested in the following processes:
Separation ☐ Extraction ☐ Dehydration ☐ Clarification ☐ Coating ☐
Filtration ☐ Draining ☐ Thickening ☐ Impregnation ☐ Sedimentation ☐
ANY OTHER PROCESS.....
SAVE TIME, SPACE AND COSTS WITH
A.T. and M. CENTRIFUGING
Name.....Title.....
Company.....
Street.....
City.....Zone.....State.....

Copr-fibre

LAMINATED
Long-fibre BLANKETS

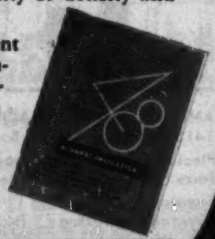


Vastly Improve Insulation
APPLICATION . . . EFFICIENCY . . .
PERFORMANCE!

Here's Why: Copr-fibre Blankets are made by laminating long, mineral wool fibres together to form a tough, resilient blanket *before wire mesh is attached.*

As a result this exclusive Copr-fibre two-stage manufacture gives you these advantages:

- **FASTER APPLICATION,** because laminated blankets cannot loosen or fall apart under the abuse of handling. And because Copr-fibre blankets come in convenient large sizes, are light in weight, clean, shot-free.
- **MORE INSULATING EFFICIENCY,** because laminated, longer fibres guarantee lower thermal conductivity. Two-stage manufacture is your insurance of uniformity of density and of consistency in all dimensions.
- **BETTER PERFORMANCE,** because resilient long-fibre Copr-fibre blankets maintain integrity, both of insulation and weatherproofing, throughout expansion and contraction cycles of heated and cooled equipment.



SEND FOR THIS BULLETIN. Copr-fibre Bulletin 511 gives you all the facts on what we believe is the only *modern* blanket insulation. Your copy will be sent free upon request. Write today.

Telephone: Aurora 9207

NAMES IN THE NEWS, *cont. . .*

University of California. Former director of the research division of AEC.

Oscar G. Burch. To coordinate all engineering and research activities, Owens-Illinois Glass Co. Posts since joining the company in 1931: research chemist; manager of the general research division at the Alton, Ill., plant; director of the company's research program; vice president.

Oscar G. Burch

Howard L. Bender

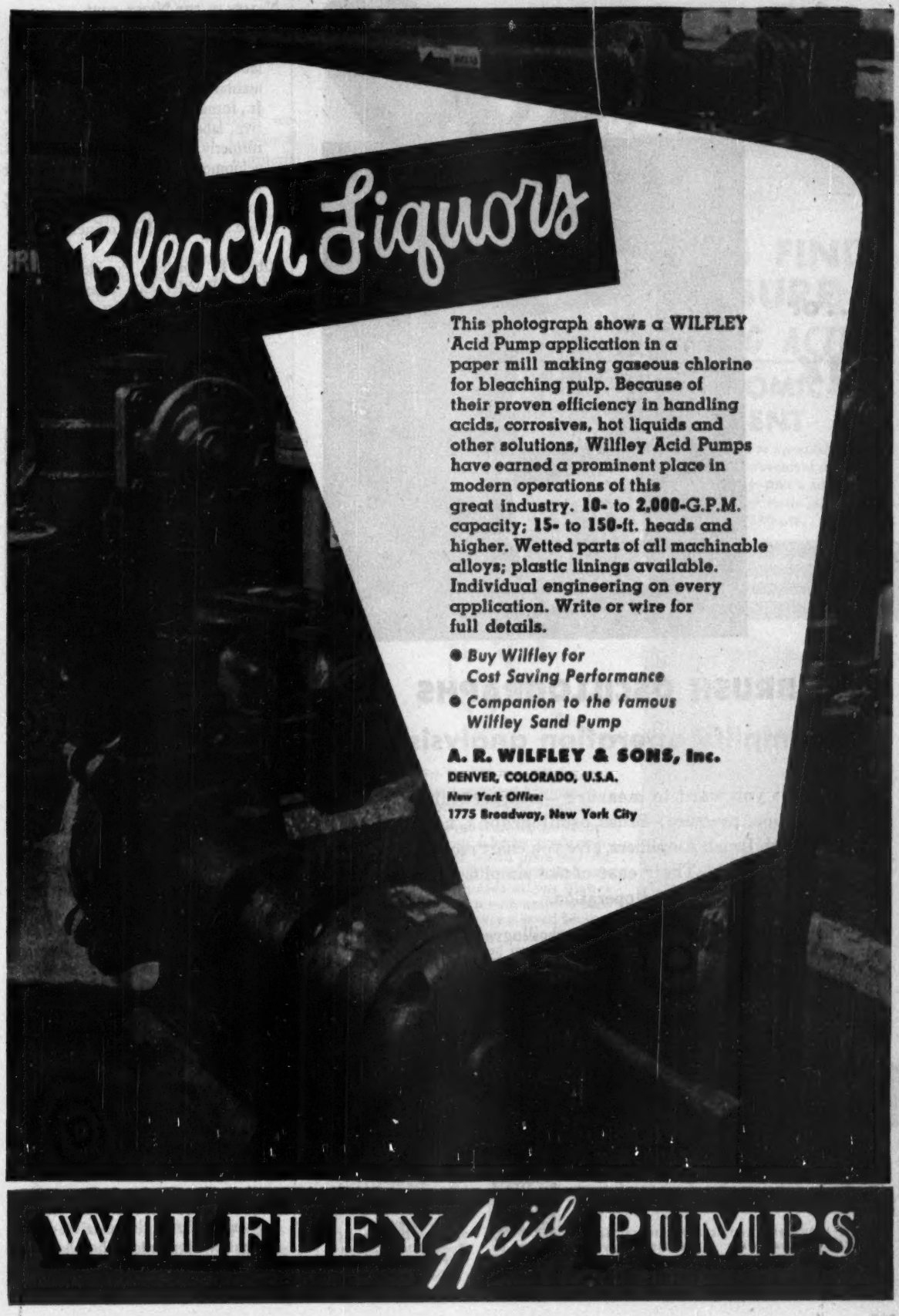
Howard L. Bender. Recipient of the twelfth annual John Wesley Hyatt Award for achievement of wide importance to the plastics industry. Assistant director, research and development department, Bakelite Co. Has worked in the field of phenolic condensation polymers since 1923 when he joined Bakelite. Doctorate in chemical engineering from Columbia.

Donald S. Gilmore. Reelected as president of the American Drug Mfrs. Assn. Chairman of the board and managing director of the Upjohn Co., Kalamazoo, Mich.

Frank Passal. Assistant director of research, plating division, United Chromium, Inc., New York. Has been a member of the company's research staff since 1934. Graduate of the University of Pennsylvania.

Reuben W. Cornell. Plant manager of Pittsburgh Plate Glass Co.'s linseed oil division, Red Wing, Minn. Has served as production manager of the division for 22 years. Joined the company in 1922. Chemical engineering graduate of the University of Minnesota.

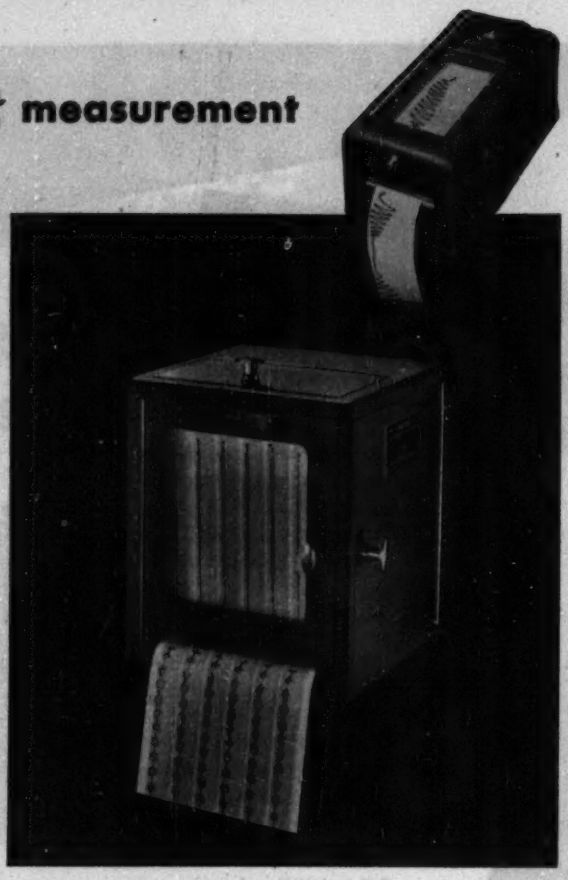
Charles L. Thomas. Associate director of Sun Oil Co.'s research and development department in charge of all line activities. Has been man-


Bleach Liquors
This photograph shows a WILFLEY Acid Pump application in a paper mill making gaseous chlorine for bleaching pulp. Because of their proven efficiency in handling acids, corrosives, hot liquids and other solutions, Wilfley Acid Pumps have earned a prominent place in modern operations of this great industry. 10- to 2,000-G.P.M. capacity; 15- to 150-ft. heads and higher. Wetted parts of all machinable alloys; plastic linings available. Individual engineering on every application. Write or wire for full details.
● Buy Wilfley for Cost Saving Performance
● Companion to the famous Wilfley Sand Pump
A. R. WILFLEY & SONS, Inc.
DENVER, COLORADO, U.S.A.
New York Office:
1775 Broadway, New York City
WILFLEY Acid PUMPS

ONE measurement

... or

SIX



BRUSH OSCILLOGRAPHS

simplify operation analysis

● What do you want to measure — temperature, strain, flow vibration, pressure? Brush oscillographs, used in conjunction with Brush Amplifiers, give you chart records of data, *recorded instantly.* Their ease of use simplifies analysis of pilot plant or process plant operation.

Brush offers a range of precision oscillographs designed to suit your needs, from the single-channel instrument up to the 6-channel oscillograph. The latter permits simultaneous multi-channel recordings of electrical or mechanical phenomena.

Get the facts about simplified analysis now. Write Brush Electronics Company, Dept. MM-7, 3405 Perkins Avenue, Cleveland 14, Ohio. Brush representatives are located throughout the U. S. In Canada: A. C. Wickman, Ltd., Toronto.

BRUSH ELECTRONICS COMPANY

formerly
The Brush Development Co.
Brush Electronics Company
is an operating unit of
Clevite Corporation.

INDUSTRIAL AND RESEARCH INSTRUMENTS
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES
MAGNETIC RECORDING EQUIPMENT
ULTRASONIC EQUIPMENT

ager of the company's research laboratory at Norwood, Pa. New assistant directors: **John G. Moxey Jr.**, formerly manager of the automotive laboratory; **James I. Harper**, formerly chief of the process development section, development laboratory; **Norman Thompson**, formerly assistant superintendent of Sun's Marcus Hook refinery.

Albert E. Forster. President of Hercules Powder Co. Has been vice president and member of the executive committee since 1951. Elected a director of the company in 1940. First joined Hercules in 1925. Stanford graduate.

Albert E. Forster Arthur R. Broadman

Arthur R. Broadman. Vice president of Heyden Chemical Corp. in charge of engineering and purchasing. Since 1948, assistant vice president of Heyden in charge of engineering. Director of St. Maurice Chemicals, Ltd. Joined Heyden's engineering division in 1939.

F. M. Galloway. Vice president in charge of research and development, Quaker Rubber Corp., Pittsburgh, Pa. Posts since joining the company in 1933: assistant chemist, chief chemist, technical superintendent. Member of the board of directors since 1947. Previously with Master Tire and Rubber Co. Graduate of the University of Akron.

Norman L. Krey. Manager of northwest operations of Kaiser Aluminum & Chemical Corp. He will supervise development plans and industry relations for both reduction and fabrication operations.

John H. Payne Jr. Senior research group leader in the research department of Monsanto's phosphate division. Joined Monsanto in 1944 as a chemist at Mound Laboratory,

Miamisburg, Ohio; became a group leader in 1946 and in 1949 was made a section chief. Doctorate from Purdue.

William J. Smythe. Technical service manager, Elastomer Chemical Corp., Newark, N. J. Formerly with Monsanto.

John P. Remensnyder. A vice president of McArthur Chemical Co., Ltd., a Canadian company. Chairman of the board of Heyden Chemical Corp. Another new McArthur vice president. **Simon Askin,** president of Heyden.

Tracy M. Patrick. Group leader in organic chemistry, Monsanto's Merrimac Div. in Boston. Has been with the company's central research laboratories. Joined the company in 1942. Doctorate from Purdue.

Russel B. Caples. President and director of Anaconda Aluminum Co. Has been manager of Anaconda's Great Falls, Mont., reduction department since 1941.

David F. Edwards. From assistant head of the petroleum products division at the Baton Rouge refinery of Esso Standard Oil to assistant general superintendent of the company's Bayonne N. J., refinery. With Standard Oil since 1920.

David H. Chadwick. Senior research group leader at the Anniston, Ala., laboratories of Monsanto's phosphate division. Has been a group leader at Anniston since 1949. With Monsanto since 1946. Doctorate from the University of Illinois.

Ernest A. Remesch. Superintendent of Foote Mineral Co.'s new lithium processing plant at Sunbright, Va. Has been assistant plant manager of the Melson Fertilizer Co., Georgetown, Dela. From 1934 to 1950, with Du Pont where he held industrial engineering, chemical engineering and production supervisory position in several plants throughout the country. Graduate of Ohio State.

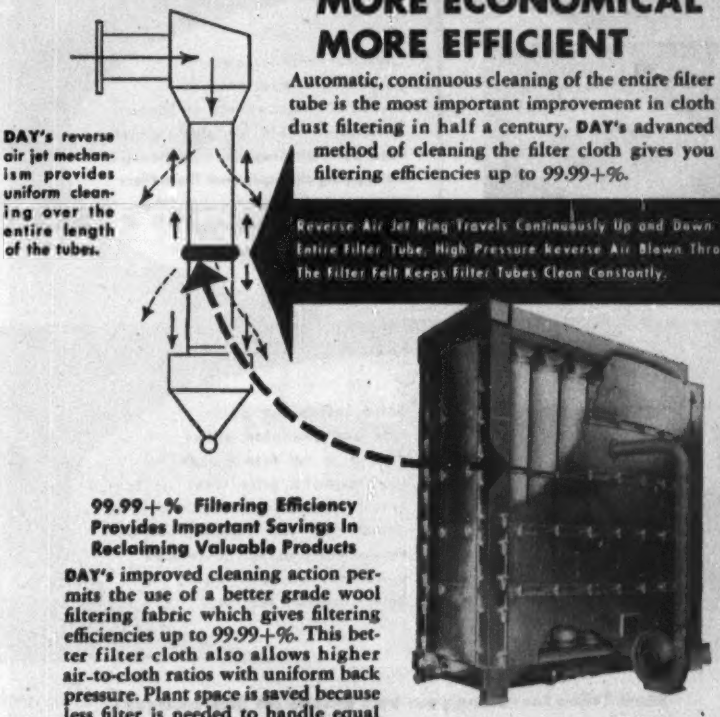
John T. Barton and **F. N. Whitson.** Assistant superintendents in the ethylene glycol department of Dow's Freeport, Tex., plant. New

DAY SINCE 1881

DUST CONTROL

A SINGLE UNIT OR A COMPLETE SYSTEM

CHEMICAL PLANTS FIND DAY HIGH PRESSURE REVERSE AIR JET CLEANING ACTION


DAY's reverse air jet mechanism provides uniform cleaning over the entire length of the tubes.
Reverse Air Jet Ring Travels Continuously Up and Down The Entire Filter Tube. High Pressure Reverse Air Blown Through The Filter Felt Keeps Filter Tubes Clean Constantly.

MORE ECONOMICAL MORE EFFICIENT

Automatic, continuous cleaning of the entire filter tube is the most important improvement in cloth dust filtering in half a century. DAY's advanced method of cleaning the filter cloth gives you filtering efficiencies up to 99.99+%.

99.99+% Filtering Efficiency Provides Important Savings In Reclaiming Valuable Products

DAY's improved cleaning action permits the use of a better grade wool filtering fabric which gives filtering efficiencies up to 99.99+%. This better filter cloth also allows higher air-to-cloth ratios with uniform back pressure. Plant space is saved because less filter is needed to handle equal volumes of air, and one DAY "AC" Dust Filter can handle four different product streams simultaneously, without mixing. It will pay you to investigate the DAY "AC" Dust Filter for your dust control program.

LICENSED BY W. J. HERSEY, JR.

The DAY Company

856-3rd Ave. N.E., Minneapolis 13, Minn.

IN CANADA: P.O. Box 70N, Ft. William, Ont.

Branch Plants: Buffalo, Ft. Worth, Welland, Ont.

Send Coupon Now for Free Booklet on Dust Control with Comparison Charts.

GENTLEMEN: *Please send Dust Control Bulletin 528 of facts, figures and charts.*

Name_____

Company_____ Title_____

Address_____

CHEMISEAL GASKETS

ARE IMPERVIOUS TO

ACIDS, CAUSTICS, SOLVENTS

"Teflon's inertness to all chemicals, excepting molten sodium and fluorine, has become so well known that Chemiseal Gaskets have become standard for corrosion and contamination problems throughout industry.

Chemiseal Teflon-jacketed gaskets are available in any size, with a variety of filler materials suitable for glass, glass-lined, porcelain-lined, Carbate, Haveg or metal piping and equipment. These fillers are protected on both faces and the inside diameter by the chemical resistant Teflon jacket.

Solid Teflon cut gaskets are available either as ring or full face gaskets for all standard pipe sizes or for irregular shaped openings. Solid Teflon gaskets 1/8" thick generally can be used wherever a 1/8" compressed asbestos gasket would be mechanically suitable.

Sheet Teflon for cutting your own gaskets for field emergencies, is available in thicknesses from 1/16" and in standard sheet sizes up to 36" square. Write for catalog or send blue prints for special gasket requirements.

UNITED STATES GASKET COMPANY

UCS

FLUOROCARBON PRODUCTS DIVISION

FABRICATORS OF TEFLON KEL-F AND OTHER FLUOROCARBON PLASTICS

CAMDEN 7, NEW JERSEY

What's behind the Teflon curtain

assistant superintendents in the light hydrocarbons department of the plant: **Don Rikard, Guy H. Watkins** and **E. H. Ivey, Jr.** New assistant superintendent of production in the vinyl-vinylidene department: **J. T. Brawner.**

George Rieger. Program executive of the plastics section of the NPA's chemical division. On leave of absence as manager of the evaluation research division, Hercules Powder Co. With Hercules since 1947. Previously, special assistant to the vice president, Ethyl Corp., New York. Studied chemical engineering at the universities of Louisville and Minnesota.

George M. Walker. Vice president in the chemical division, Koppers Co. An assistant vice president since 1951, he is manager of the project department of the chemical division.

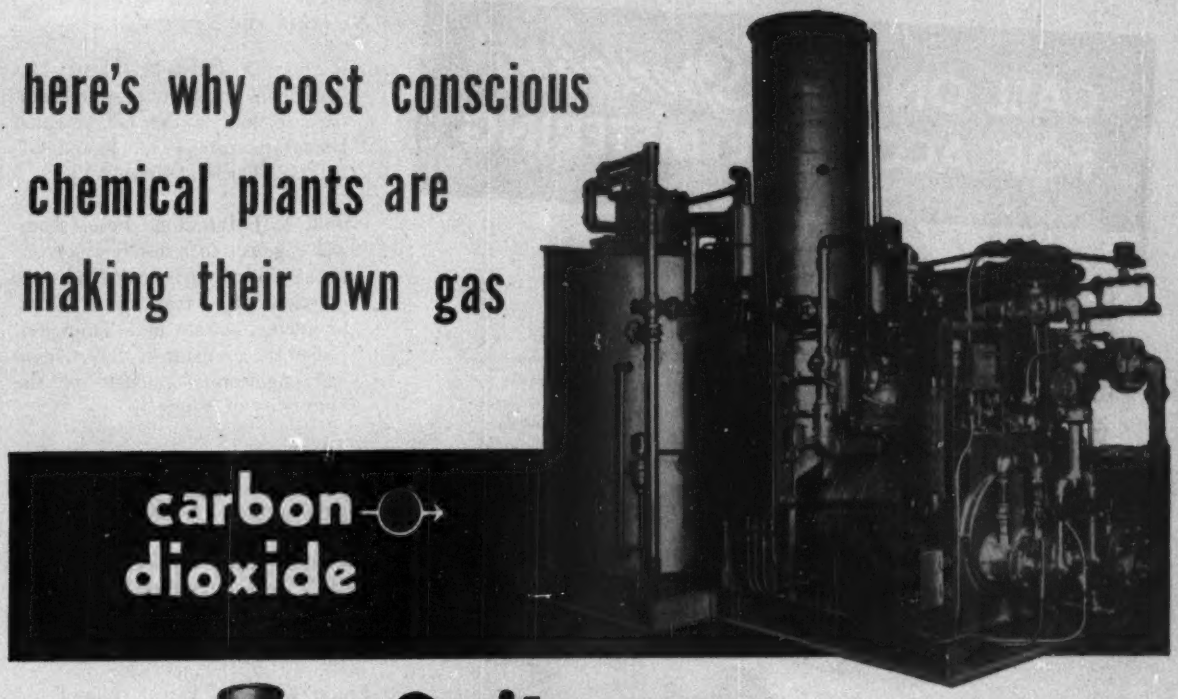
J. Boiseau Wiesel. Retires as assistant to the general manager of Hercules Powder Co.'s cellulose products department. Joined Hercules in 1915 as a chemist at a plant in Curtis Bay Md. Has been a frequent lecturer throughout the country before many technical groups in the coating industry on the development and use of lacquer. Studied at Loyola College and Johns Hopkins.

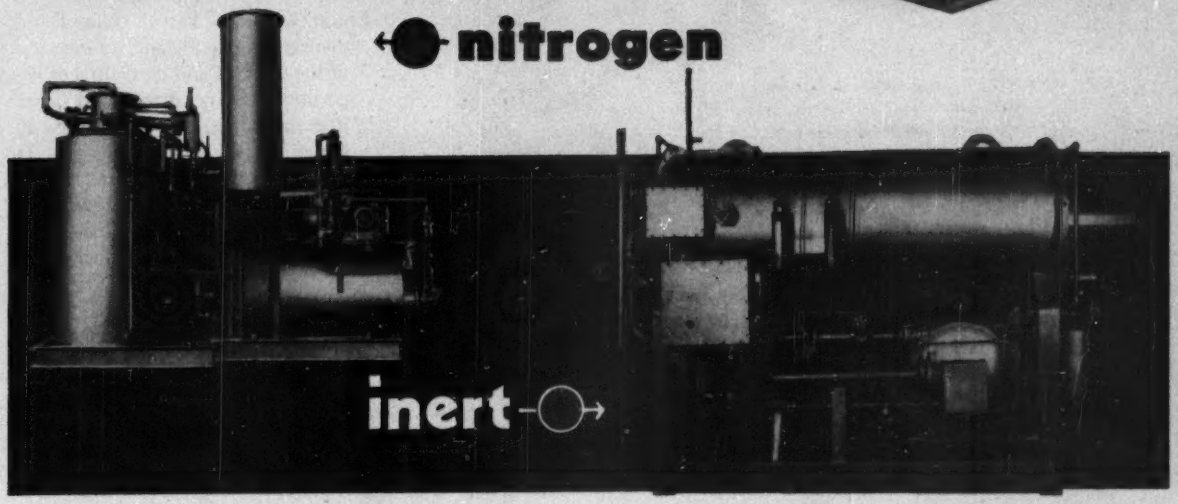
Paul A. Keene. Assistant to the director of development, Solvay Process Div. With Solvay since 1919. Studied at Hiram College and the University of Michigan.

Raymond W. McNamee. Winner of the 1953 Herty Medal for outstanding contributions to chemistry in the Southeast which is presented by the Georgia section of ACS. Superintendent of the research and development department of Carbide and Carbon in South Charleston, W. Va. Joined the South Charleston research laboratories in 1933. He was directly responsible for the development of a large-scale production process for making allethrin. Doctorate from Northwestern.

William E. Cass. Manager, new product development laboratory of the General Electric Co.'s chemical

here's why cost conscious chemical plants are making their own gas





Solid investments that pay for themselves in two years or less — that's what chemical people, who have installed Gas Atmospheres' gas generating equipment, have to say about these compact, money-saving units.

If you now use carbon dioxide, nitrogen, or inert gases in the manufacture or packaging of your product, or are considering adapting this modern method to your operation, it will pay you to find out what we mean when we say that — if you use gas, in any amounts at all, Gas Atmospheres can show you, with your own figures, how you can save the cost of the equipment in two years or less, and from that point on have the most inexpensive gas supply available.

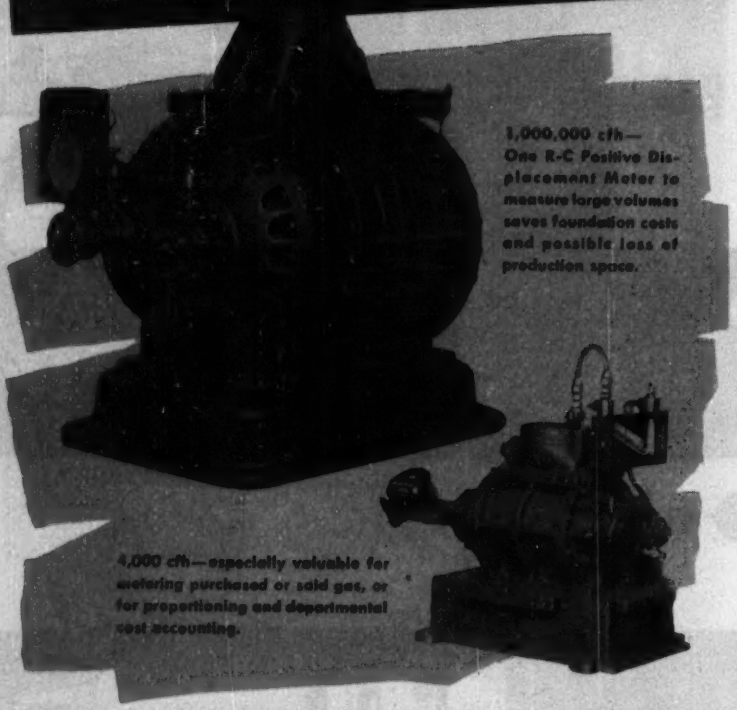
Get the facts. Write today. Let us know the amounts and type of gas you use and we'll be glad to show you why last year more chemical plants installed Gas Atmospheres equipment than ever before.

gas Atmospheres, inc

equipment for producing industrial gases

20005 WEST LAKE ROAD CLEVELAND 16, OHIO

CALL ON THE "Specialists" FOR ACCURATE METERING


1,000,000 cfh—
One R-C Positive Displacement Meter to measure large volumes saves foundation costs and possible loss of production space.
4,000 cfh—especially valuable for metering purchased or sold gas, or for proportioning and departmental cost accounting.

The successful performance of Roots-Connersville Positive Displacement Meters has long been proved by large and small industrial plants and public utilities. These users rate them high in such basic essentials as:

Accuracy—not affected by pressure, wide ranges in loads or other variables. Absence of valves, vanes and other small parts insures "cash register" accuracy over years of use.

Capacity—from 4,000 cfh to 1,000,000 cfh in one unit, with ample ability to absorb overloads.

Compactness—smallest made for industrial use in foot-for-foot of capacity. Can be located in otherwise unusable space, thus saving production areas.

Almost a century of experience in handling gas and air, exclusively, goes into the design and construction of R-C Meters. They're part of the comprehensive line of blowers, exhausters, gas and vacuum pumps and related equipment, which are the products of R-C Specialists, and which are in widest use in industry.

A new bulletin, M-152, gives complete data on R-C Meters, including a handy selection table which simplifies your choice of the right meter to suit your specific application. Your copy will be sent on request.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER
A DIVISION OF DRESSER INDUSTRIES, INC.
537 Illinois Ave. • Connersville, Indiana

NAMES IN THE NEWS, *cont. . .*

division in Pittsfield, Mass. Has been manager of the organic chemistry section of the GE research laboratory since 1950. Joined GE in 1942. Doctorate from NYU.

Harold T. J. Littleton. From chemical engineer to research supervisor in the research division of Du Pont's polychemicals department at the experimental station in Wilmington. Joined the company in 1949. Chemical engineering graduate of the University of Virginia.

W. Henry Linton, Jr. Research supervisor in the research division of the polychemicals department at Du Pont's experimental station in Wilmington. Has been a member of the company's research staff since 1949. Doctorate in chemical engineering from MIT.

Ernest K. Bean. Patent counsel and manager of patents and information of the research and development department of the Chemstrand Corp. For the past 12 years with B. F. Goodrich Co., first engaged in patent matters with the firm's chemical division and later as assistant patent counsel. Studied chemistry at the University of Kentucky, law at Akron Law School.

John H. Wishnick. In charge of chemical manufacturing at the Chicago and Brooklyn plants of Witco Chemical Co. Has been manager of the company's Chicago plant. Came to Witco in 1948 as a petroleum engineer for the Continental Carbon Co. Graduate of the University of Oklahoma.

George E. Ham. Group leader in exploratory research on synthetic fibers, research and development department of Chemstrand Corp., Decatur, Ala. New chemist in organic process research: **Clarence I. Johnson.** Research chemist in the polymer section: **Rutherford B. Thompson, Jr.** Group leader of the general process section: **Edward H. Sundbeck.** Textile researcher: **Peter P. Hermes.**

Frederick M. Belmore. Deputy manager of the AEC's New York operations office. With the national atomic energy program since 1943

and had served as director of production for the New York operations office since 1947 when the AEC took over control of the program from the Manhattan Engineer District. With DuPont from 1937 to 1943. Chemical engineering graduate of the University of Virginia.

R. M. Buckley. Executive vice president, East Texas Pulp and Paper Co. Formerly vice president of the Scott Paper Co. Graduate of the University of Washington.

George G. Crewson. Technical consultant to the administrative staff of the chemical divisions, Food Machinery & Chemical Corp., New York. Continues as director of engineering, Buffalo Electro-Chemical Co., a post he has held for a decade.

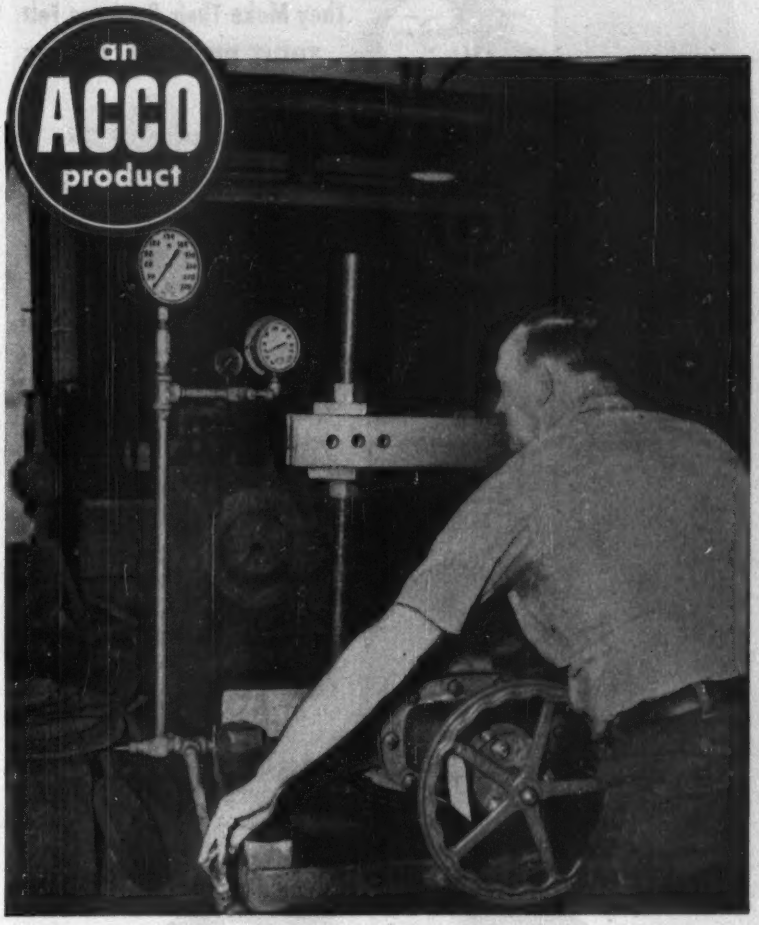
Emil Milost. New Member of the staff of Shield Coatings Corp., Verona, N. J. Previously associated with the Industrial Resin Corp., France, Campbell & Darling, Inc., and the Vita Var Co.

Norman Amend. Assistant manager, organic chemicals, Michigan Alkali Div., sales, Wyandotte Chemicals Corp. Before joining Wyandotte in 1952 as a technical service representative, he was in the special products department of the Buffalo Electric Chemical Co.

Robert C. Wade. New member of the chemical research laboratory staff at Metal Hydrides Inc. of Beverly, Mass. Formerly a research chemist with Du Pont and National Distillers. Oberlin graduate.

Nat Kessler and **Noel Myers.** Senior chemical engineers, A. E. Staley Mfg. Co., Decatur, Ill. Mr. Kessler has been technical superintendent of the company's solvent extraction plant at Painesville, Ohio. Studied chemical engineering at Washington University. Mr. Myers studied at the University of Illinois and Princeton.

Edward G. Thoenes. New member of the development department of Monsanto's phosphate division. Has been assistant chief chemical engineer of the division since mid-1952 and division project engineer for the company's elemental phosphorus



Why HELICOID Gages Prove So Dependable, So Much Longer...

● Hydrostatic testing of valves on production lines gives gages a continuous workout. Every few minutes, all day long, high pressure water is run into valve after valve. Each time the gage surges up, levels off, and then suddenly drops back to zero.

Wear on gear teeth would be a constant headache—BUT not with a HELICOID Gage because—*it doesn't have teeth!* A simple stainless steel roller and long life cam absorb the surges and practically eliminate wear. Consequently, a HELICOID Gage after thousands of cycles is just as good as the day it was made.

Here you see Helicoid Gages on a hydraulic application. You can also get HELICOID Gages for pressure, vacuum, or compound service—in all pressure ranges; in various sizes and shapes; with black, white, and radiant faces; wall, stem, flush, and panel mountings, or flangeless cases.

Write today for full details on HELICOID Gages —they retain original accuracy longer, last longer, cost less per gage, per year.

ACCO

HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE

929 Connecticut Avenue • Bridgeport 2, Connecticut

HELICOID
Pressure • Vacuum
GAGES

They Make Their Presence Felt

TORIT DUST COLLECTORS

Here is the hidden Torit Dust Collector. Compact and self-contained it fits easily into present and future production layouts. Available in sizes up to 5 H.P.

Completely hidden in unused space behind this hob grinder is a Torit Dust Collector, yet its presence is felt throughout the shop. The operator knows it's there because of the absence of irritating dusts. The inspector knows it because of fewer rejects. Even the front office feels its presence through higher production and better employee relations.

Banish the spectre of bad working conditions. Equip all dust-creating machines with Torit Dust Collectors. Wide range of models and sizes. Low original and operating costs. For full information write:

TORIT

MANUFACTURING CO.

315 Walnut Street St. Paul 2, Minn.

ALBERT pipe supply co., inc.

BERRY AT NORTH 13TH ST. • BROOKLYN 11, N. Y.

NAMES IN THE NEWS, *cont. . .*

plant at Soda Springs, Idaho. Joined the company in 1941. Chemical engineering graduate of Washington University.

Louis W. Davis. President, Metal Hydrides Inc. Previous positions with the company: research chemist, chief chemist, factory manager, sales manager and, most recently, vice president.

J. Kenneth Craver. Manager of government business development, a newly-created post in the development of Monsanto's organic chemicals division. Has been manager of the development department's resin materials and functional fluids section. Joined the company in 1938 as a research chemist for the organic chemicals division. His successor in the resin materials section: **George R. Buchanan** who has been with Monsanto since 1945.

K. E. Marple. Manager of the Denver laboratory of Shell Development Co.'s agricultural research division. Formerly acting department head at the company's Emeryville, Calif., research center. With Shell since 1935. Doctorate in chemistry from Iowa State.

Julian C. Smith. From associate professor to full professor, chemical engineering, Cornell. Before joining the Cornell faculty, with Du Pont in process development work. Studied chemistry and chemical engineering at Cornell.

J. L. Whiteside. Manager of Monsanto's new elemental phosphorus plant at Soda Springs Idaho. Has been production superintendent at a similar plant of the company's in Tennessee. Chemical engineering graduate of Alabama Polytech.

Allen F. Jacobson. Technical assistant to the manager of the Bristol, Pa., plant of Minnesota Mining & Mfg. Co. Previously held a similar position in the company's tape converting plant at Hutchinson, Minn. Chemical engineering graduate from Iowa State.

L. Gordon Utter. In charge of all technical service work covering Diamond Alkali Co.'s line of organic

Now—
fast insulation protection

Laykold®
ASPHALT SPECIALTIES

WEATHERCOAT
sprays on!

—in one-third the time required for troweling

● **FIRST COAT** bonds and protects wire netting.

● **SPRAY GUN** applies second coat, too, in fastest possible time.

● **TRIPLE-SEALED** and smooth, after wet brooming.

WEATHERCOAT—the standard of quality in the industry—for lasting protection.

AMERICAN
Bitumuls & Asphalt
COMPANY

300 BUSH ST. • SAN FRANCISCO 4, CALIFORNIA

2 Accelators®

DO A IN A
BIG JOB SMALL SPACE!

in a *South American*
DISTILLERY

Two 44' diameter Accelators treat 2800 gpm of Parana River water for clarification and color removal at a San Nicolas distillery in Buenos Aires. A portion of the treated water is used for boiler feed with supplementary treatment.

Elevated to provide gravity flow of clarified water to filters located over a clearwell, these Accelators provide water supply in a fraction of the space required by other types of water treating equipment.

Learn how the Accelator can solve your water treatment problem in *less* space at *lower* cost. Send for informative, illustrated bulletin (see coupon below).

INFILCO

INFILCO INC. *Tucson, Arizona*
Plants in Chicago & Joliet, Illinois
FIELD OFFICES IN 24 PRINCIPAL CITIES

USEFUL INFORMATION FOR YOU →

INFILCO INC., Box 5033, Tucson, Arizona
Please send us your Accelator Bulletin 1625-K

NAME_____
TITLE_____
COMPANY_____
STREET_____
CITY_____ ZONE____ STATE_____

heart of the strainer

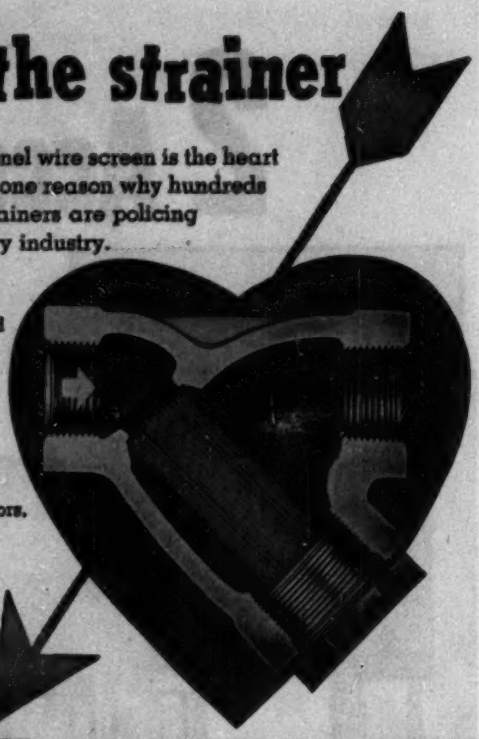
A high-grade, woven Monel wire screen is the heart of the Yarway Strainer—one reason why hundreds of thousands of these strainers are policing pipe lines in nearly every industry.

OTHER REASONS—

- cadmium plated bodies and screen caps
- straight threads, machined faces and spark-plug-type gaskets on screen caps
- ten sizes from ¼" to 3"

Sold by 216 industrial distributors. Write for Bulletin S-203.

YARNALL-WARING CO.
137 Mermaid Ave.
Philadelphia 18, Pa.



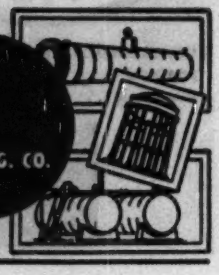
YARWAY STRAINERS

GAS Storage Tanks

• Whether you want conventional high-pressure units or something *special*—send us your inquiries. COLE can build you the kind of high-pressure tanks or vessels you require—any size, any shape, any metal. Our experience (of almost a century) in the design and fabrication of metal tanks may be of help to you. Write for catalog—"Tank Talk"

Established 1854

R. D. COLE MFG. CO.
NEWNAN, GEORGIA



ELEVATED TANKS • VESSELS • CYLINDERS
TOWERS • BINS • STANDPIPES

NAMES IN THE NEWS, *cont. . .*

agricultural chemicals. Has been plant pathologist for Phelps Dodge Refining Corp. Studied at Syracuse and Columbia universities.

Harry C. Webb. Executive vice president and a director of Pan American Sulphur Co., Houston. To supervise the construction of the company's multi-million-dollar sulfur plant at Jaltipan, Mexico. Has been with Texas Gulf Sulphur for 24 years.

J. F. Wilkes. Director of research and product development, Dearborn Chemical Co., Chicago. Joined Dearborn in 1939 as chemical engineer. Graduate of the University of Florida.

OBITUARIES

John R. Pettit, 32, assistant to the plant engineer of Hooker Electrochemical Co., died at Conneaut, Ohio, March 27.

Ernest A. LeSueur, 84, who made pioneer contribution to the diaphragm cell for sodium chloride electrolysis, died in Ottawa on March 28.

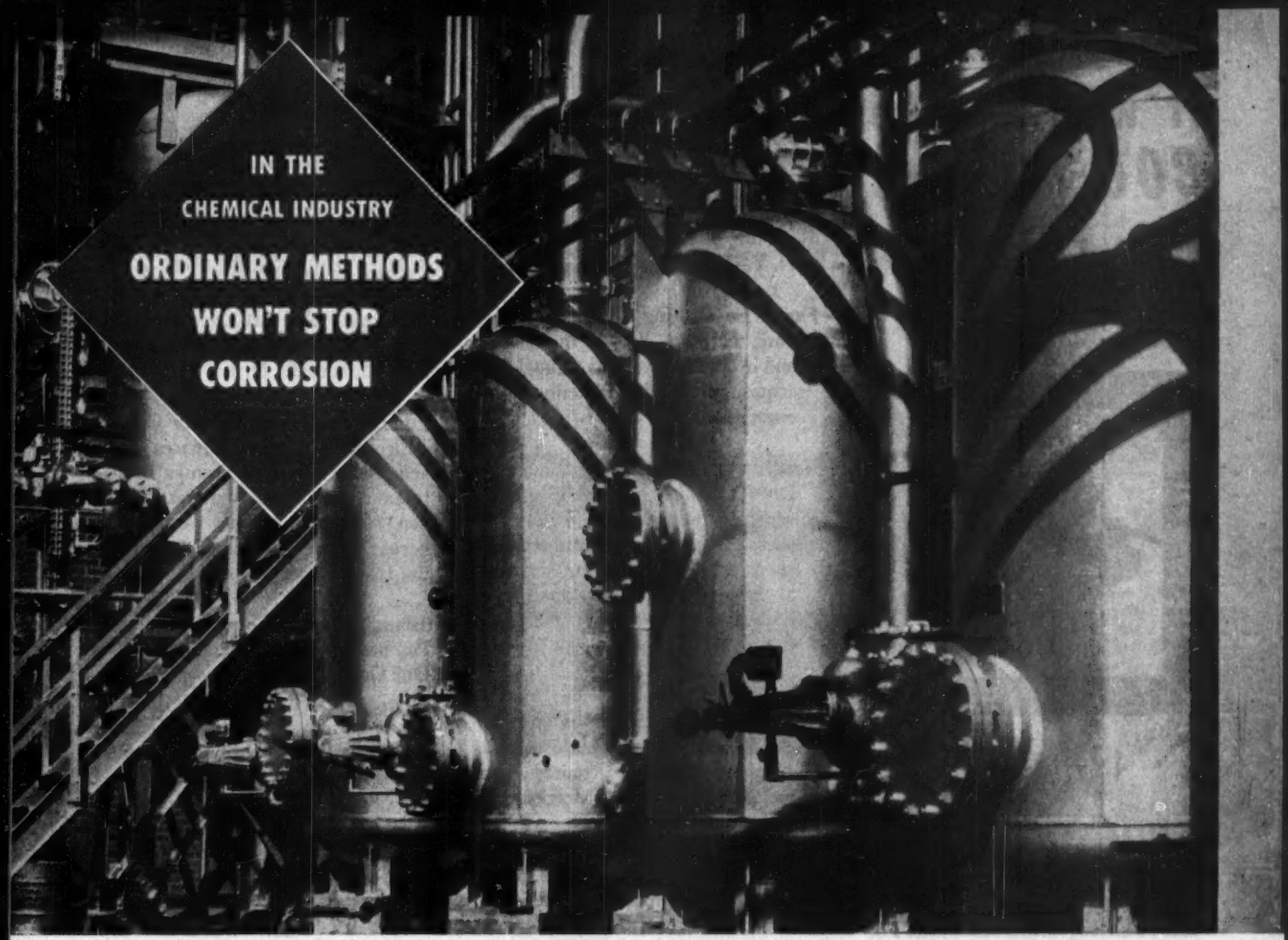
Neil A. Benson, 52, plant manager, Hagan Corp., Pittsburgh, died at Orrville, Ohio, on April 12.

Albert L. Gourley, 62, secretary, general manager and co-owner of the North Coast Chemical & Soap Works, Seattle, died on April 17.

N. N. Dalton, formerly research consultant for the Glycerine Producers Assn. and a national authority on glycerine and related products, died in Kansas City, Mo., April 26. He had been associated with the soap and glycerine industry for more than 50 years at the time of his retirement in 1951.

Hugh M. Smallwood, in charge of analytical research at United States Rubber Co.'s general laboratories in Passaic, N. J., died April 27.

Junius LeRoy Dana, 82, for more than 20 years the manager of General Electric lamp division's chemical department, died in Cleveland on April 29.



SPECIFY THE AMERCOAT METHOD— Designed to Give You *PLUS* PROTECTION

Ordinary methods for controlling corrosion usually produce the ordinary results—rapid paint failure, costly replacements, product contamination, excess down-time, and hampered production. Halfway measures and the use of one or two general purpose coatings simply cannot provide adequate protection against corrosion's ceaseless attack.

Amercoat gives you a proven method of corrosion control, assuring you proper protection through these PLUS features:

1. Careful analysis by a trained engineer of all the conditions present in each corrosion problem.

2. The ONE best recommendation for the particular problem. AMERCOAT is a complete line of coatings, each formulated to solve or control specific corrosion problems.

3. On-the-job assistance to your applicators and supervisors by a trained engineer. The AMERCOAT method ensures proper attention to surface preparation and application techniques for maximum protection.

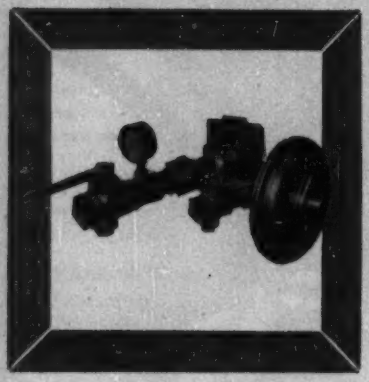
4. Complete stocks of fresh materials always near you at one of AMERCOAT's five regional warehouses or more than 20 franchised distributor warehouses throughout the United States.

5. Service based on experience. The AMERCOAT method of corrosion control is the result of nearly 20 years' experience in solving or controlling corrosion problems in every major industry throughout the United States.

Write today for the name and address of the AMERCOAT representative in your area. At no obligation, he will gladly help you analyze your corrosion problems and evaluate your present control measures. If it is determined that you have a problem within our scope of experience, he will outline a complete program of AMERCOAT's PLUS protection for your plant or equipment.

Amercoat
CORPORATION

it would take 800 pictures like this . . .



to show all the types and sizes of 'Surface' industrial burners.

One of our own "sticklers for accuracy" challenged this statement. For his satisfaction, a list was updated, which more than proved the point. Many of the 800 are working in atomic energy plants and in the production of petrochemicals, hydrogen, synthesis gas, and many organic and inorganic chemicals. The chances get better all the time that your burner requirements can be met by 'Surface,' virtually off the shelf. Our 12-page bulletin, 2-GE-8, will at least give you a bird's eye view of the possibilities.

Surface
HEAT TREATING EQUIPMENT

SURFACE COMBUSTION
CORPORATION, TOLEDO 1, OHIO

Industrial Notes

NEW LINES

Waljohn Plastics, Inc., Brooklyn, N. Y.—Rigid type plastic pipe.

Farris Engineering Corp., Palisades Park, N. J.—A line of mechanical and hydraulic governors through the acquisition of the Pickering Governor Co.

Bendix Aviation Corp.'s Cincinnati Div.—An ultrasonic "dip stick" which automatically and continuously measures, records and controls viscosity. The instrument was sold to Bendix by its developers, the Rich-Roth Laboratories, Hartford, Conn.

Sturtevant Mill Co., Boston, Mass.—A jet pulverizer for grinding or reducing solids into micron ranges. The pulverizer was acquired from the Micronizer Co., Moorestown, N. J.

Lithcote Corp.—Air-dried vinyls, baked straight and modified phenolics, catalyzed phenolics and elastomeric types coatings and linings.

Ohio Injector Co., Wadsworth, Ohio—Lubricated plug valves through an agreement with H. K. Porter Co. The semi-steel and steel valve production equipment of the Porter company have been moved to Ohio Injector's Wadsworth plant.

Clark Equipment Co., Buchanan, Mich.—Straddle trucks, power shovels and fork trucks through the acquisition of the Ross Carrier Co., Benton Harbor, Mich.

NEW LOCATIONS

Monarch Machine Tool Co., Sidney, Ohio, has moved its Chicago sales office to 6645 West North Ave., Oak Park, Ill.

Marley Co., Kansas City, Mo., has moved its Houston sales office to the Commerce Bldg.

Pioneer Pump Div. has moved its headquarters and sales offices to 2750 Guardian Bldg., Detroit and has transferred its manufacturing operations to a new plant in Paris, Ky.

Beckman Instruments, Inc., South Pasadena, Calif., has transferred its New York offices to its new plant in Mountainside, N. J.

Pittsburgh Lectromelt Furnace Corp.—Electric induction furnaces developed by Allmanna Svenska Electriska Aktiebolaget, Vasteras, Sweden. Lectromelt has exclusive license to produce the furnaces in the United States.

Pittsburgh Corning Corp., Pittsburgh, Pa., has moved its general offices to One Gateway Center.

Trane Co., La Crosse, Wis., has moved its Duluth, Minn., sales office to 414 Lyceum Bldg.

Mutual Chemical Co. of America will move its headquarters to 99 Park Ave., New York, late this year.

NEW COMPANIES

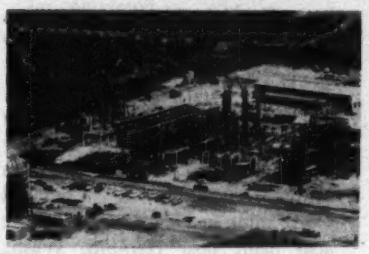
Lockwood Resins Co., Pasadena, Calif., to produce plastic base coating for the plywood forms used in concrete construction work and to provide similar coatings for use in other industries, particularly nontoxic, mildew proof sealers for the food processing field.

Placco de Columbis, Ltda., Cali, Colombia, to manufacture latex compounds, mastic flooring, industrial asphalt emulsions and other maintenance and construction specialties. It is a subsidiary of Pioneer Latex & Chemical Co., Middlesex, N. J.

Welling & Woodard, industrial consultants of New Canaan, Conn., specializing in new products and diversification.

Foster Associates, Ridgewood, N. J., to offer advisory services to public utilities and common carriers with respect to managerial and regulatory problems within the field of governmental regulation of business.

NEW FACILITIES



Shell Chemical Corp.—An ammonia plant at Ventura, Calif., to be completed late this summer. Design capacity is over 150 tons of anhydrous ammonia daily.

Atlas Mineral Products Co., Mertztown, Pa.—Enlarged production facilities for its Plastaloy reinforced polyester fume exhaust systems.

Ampex Electric Corp., Redwood City, Calif.—Three new district offices to handle sales of its magnetic recorders for instrumentation, data analysis and industrial control purposes. The new offices are at Atlanta, New York and Washington, D. C.

R. M. Hollingshead Corp.—A $750,000 plant for manufacture of chemical maintenance products for automobiles, aircraft, home and industry in Sunnyvale, Calif.

Container Corp. of America—A corrugated board plant under construction at Fernandina Beach, Fla. The company has also recently opened a folding carton plant at Oaks, Pa.

Midwest Rubber Reclaiming Co.—A 2.5 million plant in Paramount, Calif. The plant will produce 10,000 tons of reclaimed rubber yearly.

Market Coverage, Inc.—Plant near Everett, Wash., for manufacture of sewage treatment chemicals.

A. F. Holden Co.—A $200,000 plant at Vernon, Calif., for manufacture of salt baths used in metal heat treating.

Vulcan Copper & Supply Co., Cincinnati—An office in Houston to represent its engineering, manufacturing and construction divisions.

International Minerals & Chemical Corp.'s industrial minerals division—A refractory specialties plant at

how

Upjohn gets "baker's dozens"

Air moisture—troublemaker in many processes—could play havoc in the processing of "Gelfoam," Upjohn's sponge-like material for the control of bleeding in surgery. Kathabar humidity conditioning helps provide Upjohn with *"baker's dozen" production* by delivering uniformly dry air to Gelfoam baking ovens—cutting drying time, saving fuel, and maintaining product quality and uniformity.

This is just one of the numerous instances in which Kathabar's direct dehumidification is cutting costs in the chemical process industries. Manufacturers of plastics, petrochemicals, pharmaceuticals, rubber, photographic film, military powders, and many other materials use Kathabar air conditioning for production, packaging and storage. Installations range up to more than one hundred thousand cfm in capacity.

Look into Kathabar humidity conditioning now as a "straight line" to "perfect weather" production every day. Check the literature most pertinent to your problem, attach clipping to your letterhead, and mail.

☐ Send me technical data on the above installation.

☐ Send case histories on how Kathabar applies to the processing of _____

☐ Send me the HUMIDITY ENGINEER, Kathabar's quarterly bulletin, packed with application data.

Kathabar
HUMIDITY CONDITIONING

SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

ALSO MAKERS OF *Surface* INDUSTRIAL FURNACES *Janitrol* AUTOMATIC SPACE HEATING

STEARNS Type "KB" removing iron from titanate

Eliminate Iron Contamination

FROM POWDERED MATERIALS with STEARNS MAGNETIC SEPARATORS

Fine iron of abrasion in dry ceramic materials can be a very serious matter, and that's exactly what the D. M. Steward Mfg. Co., of Chattanooga, Tenn. found out. Processing critical titanate materials, they found that the presence of iron caused a serious reduction in the electrical properties of the material. But how to get the iron out positively and economically?

The answer was the STEARNS Type "KB" Magnetic Separator, a separator designed specifically for removing fine iron from powdered materials. A compact, rugged unit, the Type "KB" is perfect for batch operations and color work. Unified electrical control assures complete protection against contamination at all times.

STEARNS SEPARATOR FOR POWDERED MATERIALS

- Positive, dependable separation
- Low operating costs
- Continuous discharge of non-magnetic product
- Easy to clean
- For batch and small capacity operations
- EXPERIENCE ENGINEERED to meet your requirements

1019

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC.
618 SOUTH 28TH STREET
MILWAUKEE 46, WIS.

INDUSTRIAL NOTES, cont. . .

Janesville, Wis. Under construction now, the plant will have a capacity of 75,000 tons a year.

Allied Chemical & Dye Corp.—An aluminum fluoride plant in Bay Point, Calif., to take fluorspar from Kaiser Aluminum & Chemical Corp. mine in Nevada, and a nitric acid plant near Hanford, Wash., to supply the atomic energy installation there.

International Minerals & Chemical Corp.—A plant for the production of complete plant food mixtures at Clarksville, Tenn. The company's plant food division is also beginning construction on an addition to its plant at Somerset, Ky., that will more than double its original size.

Pittsburgh Coke & Chemical Co.'s fine chemicals division—A sales office in Philadelphia to serve Pennsylvania, New Jersey, Delaware, Maryland and Virginia.

Hi-Carbon & Chemical Co.—A $300,000 coal processing plant near Renton, Wash., for production of coal byproducts, including industrial carbon and coal tars.

Food Machinery and Chemical Corp.'s Niagara Chemical Div.—Midwestern facilities for the production of agricultural chemicals at Wyoming, Ill. The company recently bought property formerly known as the Government Hemp Plant.

Celanese Corp. of America—A Cleveland district sales office for its plastics division.

Xzit Chemicals Ltd.—A new plant in Vancouver, B. C., to make its products for the elimination of soot and fire scale from steam boilers.

General Tire & Rubber Co., Akron, Ohio—A $6 million plant under construction near Ashtabula, Ohio, to produce polyvinyl chloride resins.

Reynolds Metal Co., Louisville, Ky.—A sales office at Midland, Tex.

Builders Iron Foundry, Providence, R. I.—An extra 87,000 sq. ft. of manufacturing space for its Providence works.

Eli Lilly and Co., Indianapolis—A development and control building to be completed in mid-1954.

Dow Chemical Co., Midland, Mich.—Sales offices in Minneapolis to serve Minnesota, the northern half of Wisconsin and the Dakotas.

American Plastics Corp., Bainbridge, N. Y.—Expanded facilities for the production of reinforced plastics through the acquisition of the reinforced plastics division of Auburn Button Works.

Food Machinery and Chemical Corp.—Facilities in Brentford, Middlesex, England to manufacture products now coming off the California firm's assembly lines in San Jose. The company has bought controlling interest in an English firm, Varley Pumps and Engineering Ltd.

Calumet & Hecla's Wolverine Tube Div.—Sales offices in Columbus, Ohio, to be headed by James A. Jolly.

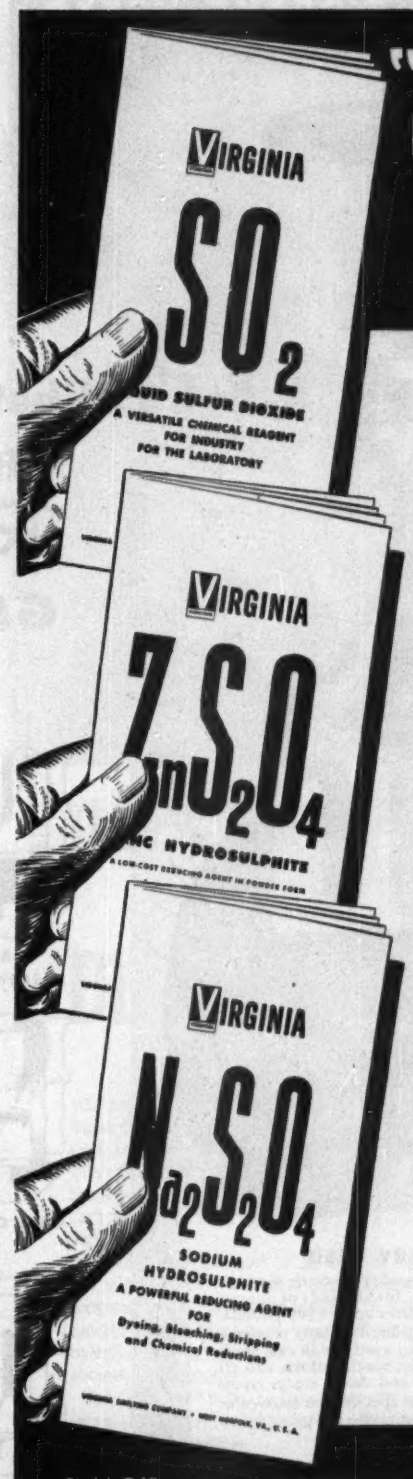
Western Safflower Corp.—A $250,000 plant to be built in Colorado Springs to produce safflower oil for paint and meal for livestock feeding.

J. R. Simplot Co.—A Pocatello, Idaho, plant which has started producing triple superphosphate fertilizers. Work is near completion on installation of two filters for making phosphoric acid and when a third filter is installed late this year, Simplot expects to produce 90,000 tons of triple superphosphate annually.

Minerals Engineering Co.—A $250,000 tungsten refinery in Salt Lake City. The plant will refine concentrates shipped in from the firm's new tungsten concentrator now under construction at Glen, Mont., and for 60,000 tons of tungsten tailings stockpiled at the plant site.

Shawinigan Resins Corp., Springfield, Mass.—The fourth expansion in its 10-yr. production of vinyl resins. This latest move will increase current capacity by 35 percent.

Michigan Tool Co., Detroit—A new building in the industrial area of Hazel Park, Mich., to house production facilities of its new Shear-Speed chemical products division.



"VIRGINIA" REDUCING AGENTS DO IT!

"Virginia" makes three reducing agents—basic chemicals which have proved invaluable in more than 40 important industries.

The most versatile of these is its 99.98+ per cent pure Liquid Sulfur Dioxide. It is favored for its properties as a reducing, neutralizing, and bleaching agent, preservative, antichlor, and pH control. "Virginia" is the world's largest producer of SO_2.

Concentrated "Virginia" Zinc Hydrosulphite is prepared by us expressly as a reducing and bleaching agent for many industries, chief among which is the pulp and paper industry. It is the *only high test* ZnS_2O_4 available commercially.

"Virginia" Sodium Hydrosulphite is widely used in textile manufacturing for efficient reducing operations in the dye house. It is noteworthy for its uniformity, strength, and stability in storage and in the bath.

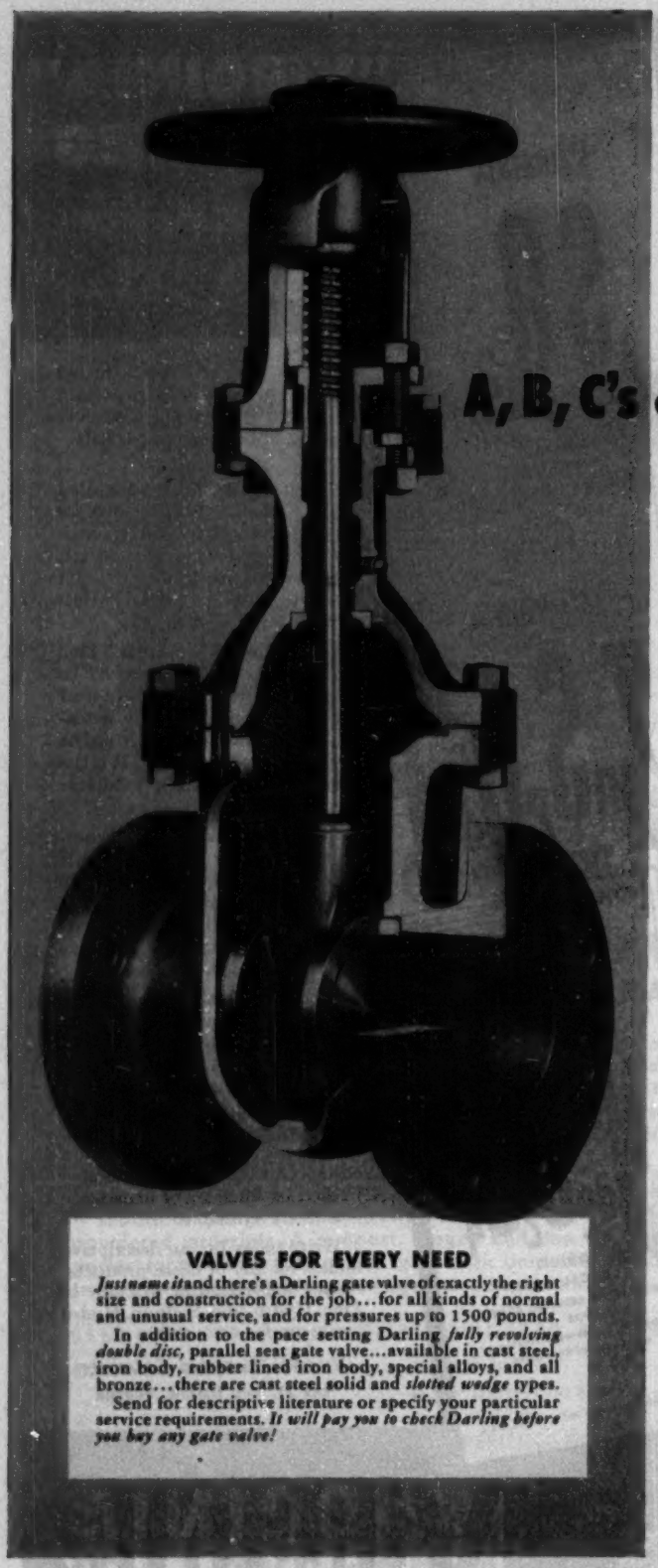
"Virginia" is constantly researching new and improved applications of these three standard reducing agents. Bring us *your* problems. Perhaps one of these chemicals can be used to advantage in your products or processes, and can cut your production costs. Our technical counsel—backed by 29 years of experience—is freely available.

Write today for our descriptive folders on any of these products. Ample experimental samples of Zinc Hydro and Sodium Hydro are yours for the asking.

VIRGINIA SMELTING COMPANY
Box 21, West Norfolk, Virginia

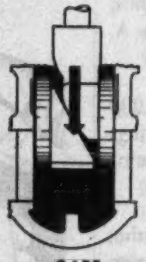
Field Offices:
NEW YORK
BOSTON
DETROIT
CHICAGO
ATLANTA

VIRGINIA Chemicals
SINCE 1898



DARLING VALVES

A, B, C's of better valve service with DARLING Revolving Disc GATE VALVES



GATE DESCENDING

A EXTRA LIFE

Fully revolving discs, independently hung, change seating position at each closing, assuring uniform wear distribution for prolonged service. Plain "no pocket" discs are interchangeable for *extra* life!

GATE CLOSED

B POSITIVE CLOSING

Faces of the upper wedge are radiused and faces of both wedges are transversely beveled for equalized wedging pressures and tight closing despite valve body distortion.

GATE RISING

C EASIER OPERATION

Wedging pressure on both discs is released before discs start to rise. Complete absence of wedging pressure during travel of discs assures easy operation and greatly prolonged valve life!

VALVES FOR EVERY NEED

Just name it and there's a Darling gate valve of exactly the right size and construction for the job... for all kinds of normal and unusual service, and for pressures up to 1500 pounds.

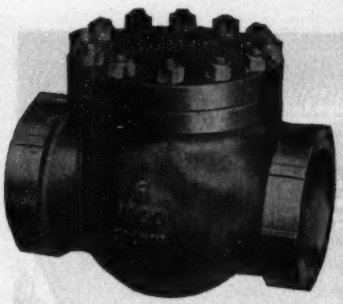
In addition to the pace setting Darling *fully revolving double disc*, parallel seat gate valve... available in cast steel, iron body, rubber lined iron body, special alloys, and all bronze... there are cast steel solid and *slotted wedge* types.

Send for descriptive literature or specify your particular service requirements. *It will pay you to check Darling before you buy any gate valve!*

DARLING VALVE & MANUFACTURING CO.

Williamsport 3, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario



MAKE YOUR NEXT VALVE A *BROWN* STEEL VALVE

VERNON offers you the famous line of Brown Steel Valves. Known throughout industry for their superior design, precision machining and dependable performance.

★ ★ ★ ★

Shown above is the Brown 1000-lb. Hydraulic, Cast Steel Swing Check Valve (Screwed Type). For steam, oil, oil vapor, gas and water. Available in 2", 3", 4" and 6" sizes.

Other Brown Valves from 150 to 2,500 lbs. working pressure.

Write today for illustrated literature.

BROWN VALVE DIVISION

VERNON TOOL CO., LTD.

1113 Meridian Ave.
Alhambra, California

P. O. Box 7555
Houston 7, Texas

OVER 40 DIFFERENT WEAVES

COTTON AND SYNTHETIC FILTER FABRICS

Filter Twills and Chain Cloths
Filter Flannels etc.
for
Plate & Frame Presses
Sector Filters
Rotary Filters
in all sizes

VINYON • SARAN NYLON • STANTEX

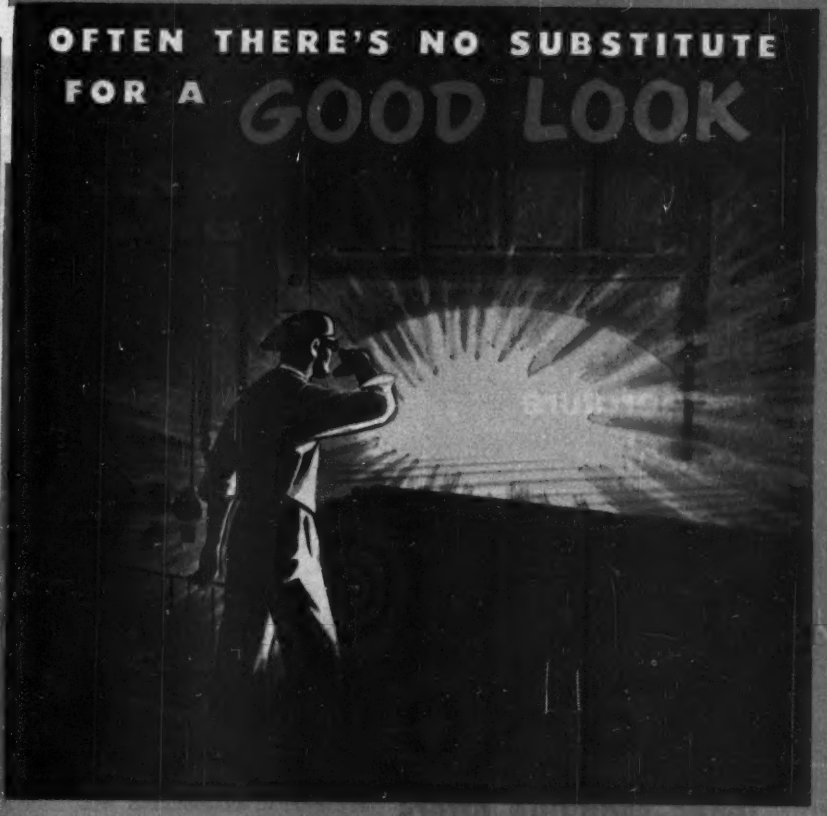
Acid & Alkali Resistant
To Corrosive Solutions
Dust Collection Bags of all Kinds
Fabricated to Meet Specifications

Samples Upon Request! State Size

WM. W. STANLEY CO.

401 Broadway New York 13, N. Y.

OFTEN THERE'S NO SUBSTITUTE FOR A GOOD LOOK



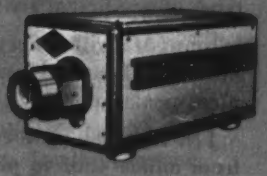
That's Why Industry Needs the DIAMOND "UTILISCOPE"

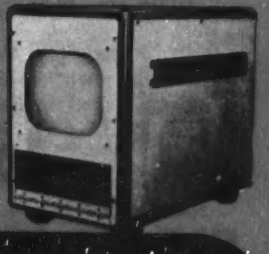
(WIRED TELEVISION)

Vital and critical processes inside a furnace often are of such a nature that only a good look can make sure the conditions are right. There are many other operations and processes in industry where the statistical information offered by the best instrumentation is no substitute for a good look . . . places where instruments can't provide the REALISM necessary to correct judgment and decision.

The Diamond "Utiliscope" (wired television) enables the operator to have a "good look" at all times, no matter how distant, dangerous or inaccessible the operation. A clear image can be brought to any desired point. Images of separate but related operations can be shown side by side, so one operator can correctly coordinate them.

The "Utiliscope" is thoroughly reliable and not expensive. It cuts costs, improves operation, saves manpower and promotes safety. Write for Bulletin.





"Utiliscope" Camera (above) and Receiver (below)

TYPICAL USES—Studying destructive tests of engines • Watching flow of molten steel • Checking remote gauge readings • Observing conditions inside furnaces • Viewing nuclear research • Coordinating materials flow on conveyors • The "Utiliscope" (Registered U. S. Patent Office)

DIAMOND "UTILISCOPE" WIRED TELEVISION

DIAMOND POWER SPECIALTY CORP.

FIRST IN INDUSTRIAL TELEVISION

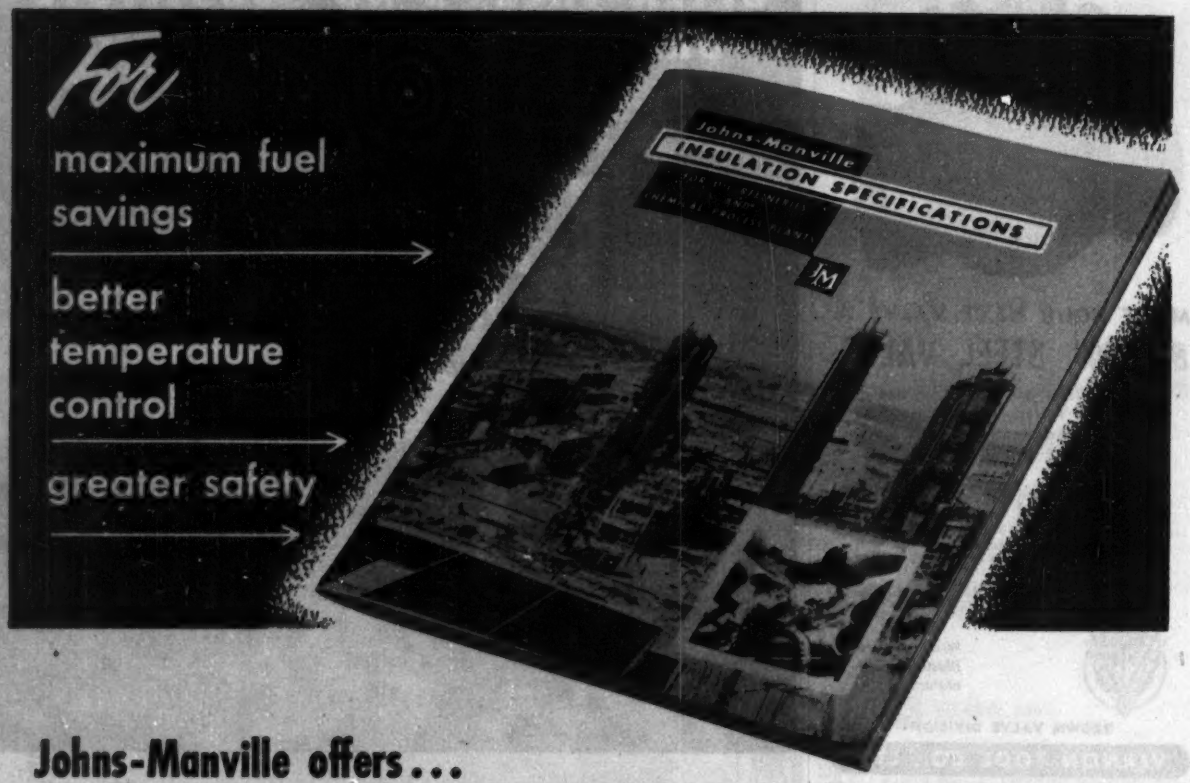
LANCASTER, OHIO • OFFICES IN 39 PRINCIPAL CITIES

Diamond Specialty Limited—Windsor, Ontario

WRITE FOR BULLETIN 1023C

4199

SINCE 1903, DIAMOND HAS MANUFACTURED QUALITY EQUIPMENT FOR INDUSTRY



Johns-Manville offers...
new 52-page THERMAL INSULATION SPECIFICATIONS manual

For the oil refining and chemical process industries—the most complete manual of thermal insulation specifications ever offered! It contains 52 pages of data, specifies the correct insulations and methods of application for equipment in every temperature range encountered in these industries. Vessels, tanks, flues, pipes, breechings, stacks, vacuum filters, oil heaters and many other types of equipment are included.

Johns-Manville offers industry undivided responsibility for all thermal insulation requirements. J-M complete insulation service includes:

J-M Materials—for every temperature requirement from minus 400F to plus 3000F. The many different kinds and forms of J-M Insulations include pipe insulation, sheets, blocks, bricks, blankets, insulating cements and fills, insulating papers and felts.

J-M Engineering—to provide the technical knowledge needed to specify the correct insulation for maximum performance. Johns-Manville has almost a century of experience in insulation engineering. It has the world's largest insulation laboratory for the development of new and improved products.

J-M Application—to insure long, trouble-free service. J-M Technical Service Units and J-M Insulation Contract Units are located throughout the country. They are staffed with men skilled in the application of Johns-Manville Insulations according to proven and successful J-M methods.

Mail coupon for your copy of manual.

This Johns-Manville manual of Thermal Insulation Specifications is offered as a service to the oil refining and chemical process industries.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville
FIRST IN INSULATION
MATERIALS • ENGINEERING • APPLICATION

Johns-Manville, Box 60, New York 16, N. Y.
In Canada, 199 Bay St., Toronto 1, Ontario

Please send me without charge copy of your Insulation Specifications, IN-128A

Name_____ Title_____

Company_____

Address_____

City and Zone_____ State_____

Chemical Engineer's Bookshelf

Edited by Lester B. Pope

Guide & Summary

WATER SUPPLY AND SEWERAGE. Third Edition. By Ernest W. Steel. McGraw-Hill Book Co., New York. 582 pages. $8.

Reviewed by S. T. Powell

Like the two earlier editions, the present revision is a comprehensive coverage of the subject. Much of the essential material in the first and second editions has been retained but modified, amplified or deleted to conform with modern developments and practice. The chapters on rainfall and runoff, ground water supplies, and sewage treatments have been brought up to date. The author has retained the presentation of specific problems, at the end of several chapters, which relate to the subject matter contained in the text. This portion of the text is worthwhile, serving to acquaint the reader with practical problems which may be encountered in practice, and is particularly helpful to engineering students. The bibliographies included at the end of each chapter have been well selected and brought up to date.

In general, this book is an excellent summary of the subject, containing sufficient detailed engineering information to guide and assist students as well as others having broader experience.

Collected Procedures

CHEMICAL ANALYSIS OF INDUSTRIAL SOLVENTS. By Morris B. Jacobs and Leopold Scheflan. Interscience Publishers, New York. 501 pages. $10.

Reviewed by C. L. Mantell

This book attempts to fill a need for a volume which covers the field of solvent analysis, desirable because of the large growth of the use of solvents in industry. Essentially it is a collection of the analytical procedures of the ASTM, the ACS, the USP, the American Association of Agricultural Chemists, federal, state, and city agencies.

The book is divided into sections on sampling, physical methods, physical and chemical methods, physiological effects, determination of solvent vapors, fractional distillation procedures, analysis by functional groups, with specific sections on paraffins and aliphatics, the aromatic and hydrocyclic, the halogenated materials, alcohols, glycols and ethers, acids and esters, ketones and aldehydes, as well as the nitrogen and sulfur compounds. There is no critical discussion of the methods and procedures.

The volume is well done mechanically but one pauses to wonder why in illustrations of laboratory apparatus it is necessary to include manufacturers' trade marks. The volume will be quite useful as a reference for those engaged in the manufacture, control, and utilization of solvents.

For Ideas

ION EXCHANGERS IN ANALYTICAL CHEMISTRY. By Olof Samuelson. John Wiley & Sons, New York. 291 pages. $6.50.

Reviewed by F. C. Nachod

Dr. Samuelson's text is the third dealing with ion exchange that has been published in the past five years, but unlike the other two general works, it singles out the analytical aspects of the field for a most comprehensive treatment.

There is some overlap in the introductory sections dealing with theory and describing the way in which to carry out ion exchange reactions. However, the section devoted to applications is where the most valuable information will be found.

It should be read not only by analysts but by other chemists and chemical engineers because of the thought-provoking ideas it contains. To be more specific, if alcohols can be determined in presence of aldehydes and ketones by removing the latter on a bisulfite charged anion exchange resin, such an analytical separation might serve well as model for a large scale technical process.

Dr. Samuelson is an acknowledged authority on ion exchange analysis: His book shows his meticulous attitudes known to many; furthermore it is written (not translated) in excellent English. There is no doubt that his book will find a deserved warm reception.

For 18 Cents per Dollar

THE MANUAL OF CORPORATE GIVING. Edited by Beardsley Ruml in collaboration with Theodore Geiger. National Planning Association, Washington, D. C. 416 pages. $6.75.

Reviewed by Blaine K. McKee

A more interesting book than its title might indicate is "The Manual of Corporate Giving," published by the National Planning Association, and edited by the chairman of the NPA Business Committee, in collaboration with the NPA Chief of Research. This book is the outgrowth of a pamphlet, "The Five Percent," written by the same two men.

Their earlier pamphlet summarized the problem of the 5 percent tax-exempt corporate contributions for the support of educational, scientific and welfare activities. The response was amazing: Within three months, 75,000 copies were sold. Many inquiries were received as to how to operate a 5 percent program.

In response to this demand the present more detailed manual was written. In addition to the editors, 24 experts in various phases of corporate giving wrote chapters. Most of these men are authorities in the main fields appropriate for corporate giving; men such as Luther H. Evans, Librarian of Congress; Lauder Greenway, president, Metropolitan Opera Guild, Inc., Norman Cousins, editor, *The Saturday Review*; John D. Millett, executive director, Commission on Financing Higher Education; Charles E. Odegaard, executive director, American Council of Learned Societies; and Thomas Parran, M. D., dean, Graduate School of Public Health, University of Pittsburgh, and former surgeon general of the U. S. Public Health Service. A chapter is included by Harry J. Rudick, professor of law, New York University, on the legal aspects of a 5 percent program, and

The fastest wrench you can put in the hands of a maintenance or production worker. Swiftly runs nuts or screws on or off—cuts costs—makes tough jobs easy. The Snap-on impact wrench delivers up to 2,000 powerful rotary blows a minute without twist or hammer shock to operator. Sets nuts solidly, or quickly reverses to break tough ones loose. ½" square drive takes sockets ⅜" to 1 1/16"—many accessory tools available. 2 models—115 volts, 220/230 volts. Available through Snap-on factory branch warehouses in principal industrial centers. Write for Snap-on Industrial catalog and new catalog of 4,000 hand and bench tools for production and service.

SNAP-ON TOOLS CORPORATION
8106-G 28th Ave., Kenosha, Wis.

*Snap-on is the trademark of Snap-on Tools Corporation.

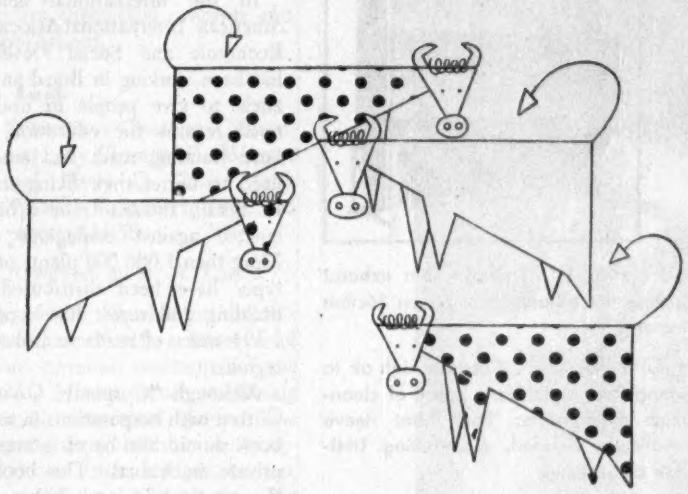
several chapters are written by heads of foundations on the administrative difficulties involved.

The 5 percent deductions allowed corporations for the support of educational, scientific, and welfare activities corresponds to the 15 percent allowed individuals. The 5 percent provision for corporations was first written into the tax laws in 1936. From 1936 to 1949, $1,891 million dollars have been given by corporations. This ranged from 0.25 percent of corporate income in 1941 to 1.24 percent in 1945 when corporate taxes were at their peak. At present the tax rates on corporations are so high that many companies can retain only 18 percent of their marginal profits. For a corporation in this bracket, the 5 percent program only costs 18¢ on the dollar. The editors of the book feel that the 5 percent provision presents corporations with an opportunity and an obligation to show their interest in the continued health of our economic and social environment.

The manual covers many fields on which 5 percent funds can be spent: community chests, hospitals, museum, libraries, music, parks and playgrounds, national health and welfare agencies, public health activities, higher education, scholarships and fellowships, elementary and secondary education, adult education and lectures, the natural sciences, medical research, the humanities and creative arts, public policy organizations, education, welfare and economic development abroad. An expert in each field tells what is being done in his field through gifts and what could be accomplished, were more money available. Each writer so convincingly states the case for his field that no one can doubt each field is worthy of support.

The authors also discuss some pitfalls to be avoided in giving money. They point out that a regular smaller contribution is more useful than a larger one that cannot be continued. They also warn that any corporation giving money for a building or equipment should take into account the cost of maintenance.

Many unusual and worthwhile activities are supported by corporate gifts. A number of companies not only encourage the employment of the physically handicapped in the company's operations, but also support



BARRETT CHEMICALS

Phenols
Cresols
Cresylic Acids
Xylenols
Pickling Inhibitors
Benzol
Toluol
Xylol
Naphthalene
Hi-Flash Solvent
Phthalic Anhydride
Maleic Anhydride
Dibutyl Phthalate
ELASTEX® 28-P Plasticizer (DOP)
"ELASTEX" 10-P Plasticizer (DIOP)
"ELASTEX" DCHP Plasticizer
"ELASTEX" 50-B® Plasticizer
Phenolic Resins
Urea Resins
Niacin (Nicotinic Acid)
Isonicotinic Acid
Pyridines
Picolines
Quinoline
Lutidines
Tar Acid Oils
Neutral Coal-Tar Oils
Coal-Tar Creosote
Bardol® Rubber Compounding Oil
Flotation Agents
CUMAR® Paracoumarone-Indene Resin

How Barrett "PA" helps make "leather goods"...without cows!

Another illustration of the versatility of Barrett Phthalic Anhydride

It's hard to beat cowhide for wear. And for a long time no synthetic substance could even compete with it. Today, however, it is possible to produce artificial leather coatings with most of cowhide's excellent properties at a fraction of cowhide's cost. The reason: improvement of vinyl resins through the use of plasticizers made from that most versatile of industrial chemicals—Barrett Phthalic Anhydride.

The magic of Barrett "PA" contributes significantly to the profits of hundreds of businesses in such fields as surface coatings, vinyl plastics, fabric coatings, dyes and drugs.

If your business uses Phthalic Anhydride, you'll find it pays to deal with Barrett. As the world's largest producer of Phthalic Anhydride and other coal-tar chemicals, Barrett can assure you uniform quality, steady supply and quick delivery.

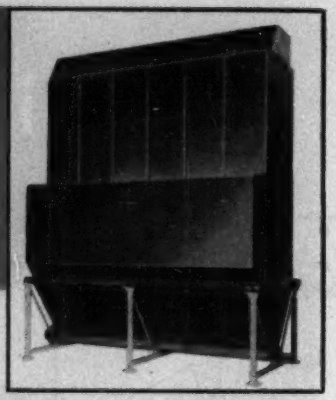
Barrett technical assistance on application problems is available without cost. Inquiries are cordially invited.

Barrett **BARRETT DIVISION**
Allied Chemical
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal

*Reg. U. S. Pat. Off.

ALL ALUMINUM CONSTRUCTION...



Simplified Modern Design

For efficient dust control, let us design your exhaust system incorporating the all-aluminum Simon Suction Filter Dust Collector!

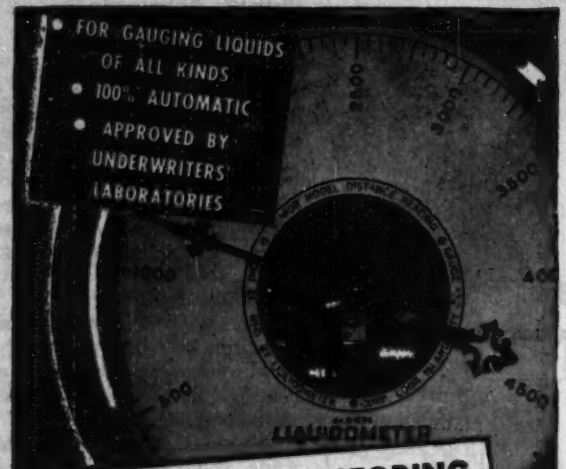
A truly modern dust collector . . . it assures high air to cloth ratios . . . long filter cloth life . . . ease of cleaning and minimum maintenance. Each filter sleeve group is automatically cleaned, maintaining UNIFORM AIR FLOW at all times.

A Simon Suction Type Filter Costs No More Than A Pressure Type Unit.

The trademark "ENTOLETER" is your guarantee of complete satisfaction.

ENTOLETER DIVISION
The Safety Car Heating and Lighting Company, Inc.
P.O. BOX 904 NEW HAVEN 4, CONN.

• FOR GAUGING LIQUIDS OF ALL KINDS
• 100% AUTOMATIC
• APPROVED BY UNDERWRITERS' LABORATORIES



"LIQUIDS WORTH STORING ARE WORTH MEASURING" WITH A LIQUIDOMETER Tank Gauge

WRITE FOR COMPLETE DETAILS

THE LIQUIDOMETER CORP.
3629 SKILLMAN AVE., LONG ISLAND CITY 1, N.Y.

research and rehabilitation centers. An outstanding example is the Bulova school for watchmaking.

In the international field, The American International Association for Economic and Social Development has been working in Brazil and Venezuela to give people in underdeveloped regions the education, health, farm training, roads and credit they need to better their living standards. In Brazil, thousands have been vaccinated against contagious diseases. More than 1,000,000 plants of various types have been distributed. Road building and repair have opened up 1,191 miles of roads to isolated farm regions.

Although "Corporate Giving" was written with corporations in mind, the book should also be of interest to the private individual. The book shows the worthwhile work being done to reduce human misery. And important as corporate gifts are, these agencies also need and deserve the support and interest of all.

Well Done

ORGANIC CHEMISTRY. Second Edition. By Lucius Junius Desha. McGraw-Hill Book Co., New York. 595 pages. $6.50.

Reviewed by F. K. Kirchner

Much thought has gone into the writing of this new edition. The book is written by a teacher who is sensitive to the problem encountered by a beginning student in organic chemistry. The author has recognized the fact that a first year course is only an introduction to the vast domain of organic chemistry. Therefore he has carefully selected his material. The order of presentation follows conventional lines, the parallel treatment of aliphatic and aromatic compounds being retained from the first edition. The author has made good use of modern theoretical principles and judiciously introduces their application to reaction mechanisms.

An attempt is made to acquaint the student with some recent advances in industrial chemistry. There are chapters and sections on the products of petroleum and coal, organosilicon compounds, and various synthetics (e.g. detergents, fibers, plastics). A list of stimulating questions follows

practically every chapter. A well-organized index completes the book.

This volume may be recommended also to those whose organic chemistry was taken some time ago and wished to be brought up-to-date on some of the modern theoretical concepts and their applications.

Quick Look

SYNTHETIC ORGANIC CHEMISTRY. By Romeo B. Wagner and Harry D. Zook. John Wiley & Sons, New York. 885 pages. $11.50.

Reviewed by A. A. Larsen

Each of the 39 chapters of this book is concerned with a summary of the more common reactions for the preparation of compounds containing a particular functional group. The functional groups are those of carbon-carbon unsaturation, halogen, oxygen, nitrogen, sulfur and heterocycles. The complexity of the compounds and methods is limited to mono and difunctional molecules. The more frequently employed and readily available journals and books from 1919 through 1950 have been thoroughly reviewed to furnish the material for the book.

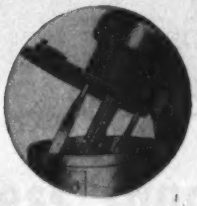
The general methods of preparation cited in the various chapters are those which work most satisfactorily and no attempt has been made to evaluate each variation of a particular procedure. Where critiques, review articles or books are available for a particular type of compound or method of preparation these references are given.

Accompanying each chapter is a table listing the compounds pertinent to the methods discussed in the chapter and additional compounds where the preparation is adequately described in the literature. The compounds are grouped in the tables according to carbon content and complexity. For each entry there is a literature reference, the reported yield, simple physical properties such as melting point, boiling point or refractive index and a cross reference to a description of the method as discussed in the chapter. Both the text and the tables contain literature references so that either portion is self contained.

This book can be recommended to the practicing organic chemist, chemical engineer or the chemical executive when a quick look into the literature is needed.

DAY PONY MIXERS

Photo Courtesy Furst-McNess Co.



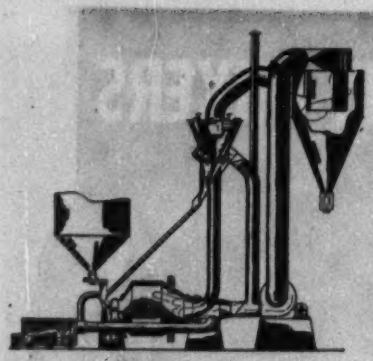
Working can cover with feed opening optional at extra cost.

FAST....
THOROUGH...
TROUBLE-FREE

DAY Gearless Type Pony Mixers are known throughout the industrial world for efficient, dependable operation. Here are the reasons: The one-piece cast head is perfectly counter-balanced for effortless tilting. Planetary mixing action with anti-thrust agitator blades effects a rapid, thorough mix. Absolute rigidity is assured by a one-piece casting for the main frame. A single geared head motor drives both agitator and can gear; single or two-speed motor optional. Stainless steel agitator blades, scrapers and cans available at extra cost. Working capacities from 40 to 125 gallons.

DAY

THE J. H. DAY COMPANY, CINCINNATI 22, OHIO



It DRIES
while it GRINDS
while it CLASSIFIES

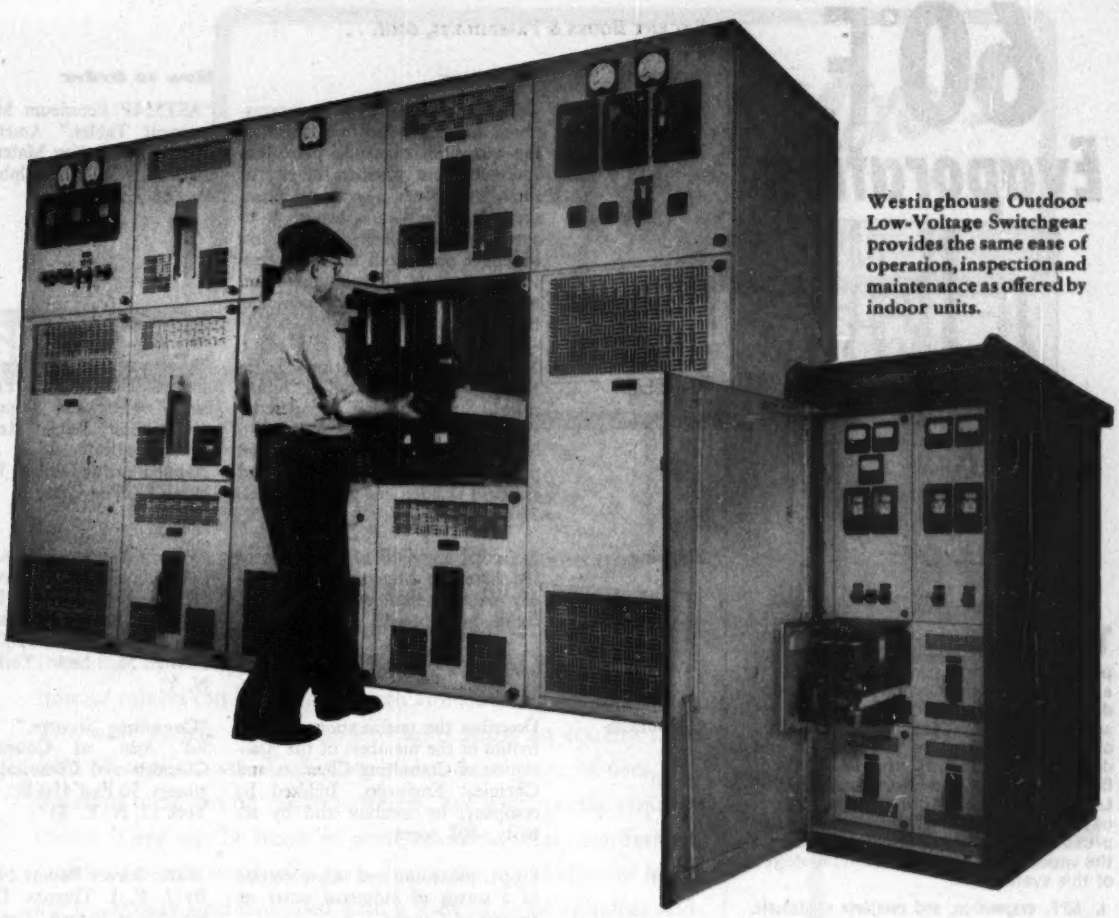
The Hardinge "Thermomill" is an ingenious combination of Conical Mill, air classification system and air preheater. It dries, grinds and classifies—in a single system—materials carrying an appreciable amount of surface moisture, reducing them to dry, finely-ground products. Write for Bulletin 17-B-11.

HARDINGE
COMPANY, INCORPORATED
YORK, PENNSYLVANIA · 240 Arch St. · Main Office and Works
New York · Toronto · Chicago · Hibbing · Boston · Salt Lake City · San Francisco

Recent Books & Pamphlets

Subject	Summary	How to Order
Air Conservation	Outlines air purification in theory and practice. Data, tables and charts useful to the engineer both in planning the application of air purification and in evaluating its economy to air conditioning. 76 pages.	"Air Conservation Engineering." Second edition. By Henry Sleik and Amos Turk. Connor Engineering Corp., Danbury, Conn. $5.
Atomic Energy	Papers by industry experts in each of the following categories: sales opportunities in the atomic field; current uses of atomic by-products; agriculture and food product applications; medicine and pharmaceutical applications; problems of industrial participation; problems of atomic power development. Minutes of a special conference, October, 1952, New York.	"Atomic Energy in Industry." National Industrial Conference Board, 247 Park Ave., New York 17, N. Y. $10.
Water Pollution	A picture of the over-all water pollution problem today. Discusses in general terms what can be done about it and whose responsibility it is. 28 pages.	Public Affairs Pamphlet No. 193. By Helen B. Woodward. Public Affairs Pamphlets, 22 East 38th St., New York 16, N. Y. 25 cents.
Management	A company guide to effective stockholder relations written by a group of security analysts with contributions by corporate executives and regulatory agency representatives. Sections on: essentials of a balanced program; the role of the security analyst; the securities act of 1933 and the securities exchange act. 58 pages.	Research Report No. 21. American Management Assn., 330 West 42nd St., New York 36, N. Y. $2.
Safety	Principles of proper warning label preparation. Includes illustrative labels for some 250 industrial and agricultural chemicals. 98 pages.	Manual L-1, Third Revision—1953. Manufacturing Chemists' Assn., 246 Woodward Bldg., Washington 5, D. C. $1.
Fans	The problems resulting from the relationship of exhaust and make up air systems and the bearing it has on the heating load. 4 pages.	Bul. 115. National Assn. of Fan Manufacturers, 2159 Guardian Bldg., Detroit 26, Mich.
Coal Gasification	Thermal requirements for the gasification of lignite in an externally heated retort. Based on thermal data collected since 1945 from a commercial-scale lignite-gasification pilot plant operated by the Bureau of Mines at Grand Forks, N. D. Data is correlated in terms of the fraction of undecomposed steam and the H_2:CO ratio. 7 pages.	Bureau of Mines, RI 4957. By M. H. Chetrick. Dept. of the Interior, Washington 25, D. C.
Instruments	Descriptions of the various methods and instruments that have been used to meter liquid sulfur and how well they have succeeded. 5 pages.	"Metering Liquid Sulfur." By E. S. Boe, C. E. Butterworth and J. R. West. Mellon Institute, 4400 Fifth Ave., Pittsburgh 13, Pa.
Protective Coating	Describes the methods used to develop a refractory coating of low thermal emissivity which could be applied to alloys used in gas turbine construction and which would withstand the severe operating conditions involving thermal shock and vibration encountered in certain parts of such mechanisms. 24 pages.	Special Report No. 1, Fulmer Research Institute, Stoke Poges, Buckinghamshire, England. 15 s.

(Continued)



Westinghouse Outdoor Low-Voltage Switchgear provides the same ease of operation, inspection and maintenance as offered by indoor units.

Now . . . flexible protection in less space

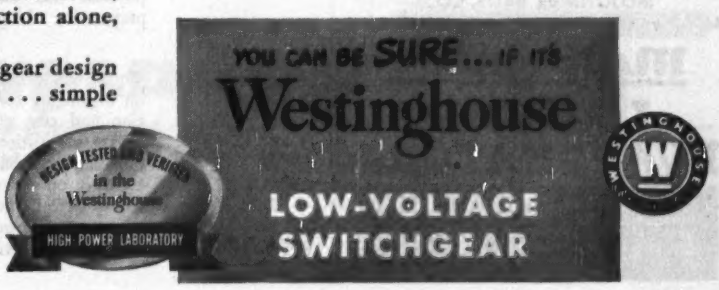
WITH WESTINGHOUSE LOW-VOLTAGE SWITCHGEAR

When you specify Westinghouse Low-Voltage Switchgear you get the most flexible low-voltage circuit protection available today. And you get it in compact, unitized enclosures that save valuable plant space . . . save you considerable planning expense . . . can be installed in a matter of hours.

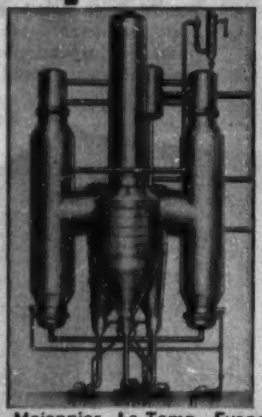
An unusual degree of flexibility results from the modern selective tripping feature of the DB De-ion® Breaker. In a single, compact device, you get the perfect co-ordination of time-delay characteristics, which confines outages to the faulted section alone, to assure maximum continuity of service.

The Westinghouse Low-Voltage Switchgear design provides easy access to all components . . . simple drawout breaker operation . . . a complete metal enclosure for safety. It is available for circuits up to 600 volts, 15,000 to 100,000 amperes interrupting duty, for indoor or outdoor service.

For complete information on Westinghouse Low-Voltage Switchgear, write for Booklet B-5282. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60794



60°F. Evaporation



THE Mojonnier Lo-Temp Evaporator provides 60°F. evaporation and complete recovery of condensate. Present applications in the Chemical Process Industries include concentration of heat sensitive pharmaceuticals and anti-biotics, low temperature fractionation and distillation of solutions, and distillation of flavor extracts and essences. In the Lo-Temp, high pressure ammonia gas is used as the heating medium, and low pressure ammonia is used to condense the vapors from the product. Advantages of this system are:

1. 60°F. evaporation, and complete condensate recovery.
2. Operating costs 27%-55% less than steam evaporators.
3. Stainless steel sanitary construction.
4. Reduced overall plant electrical costs.
5. Less cleaning cost, less time out of production for cleaning.
6. No water or sewage disposal problems.
7. Less space required for evaporator and auxiliary equipment.
8. No product damage from backfiring of boosters —no boosters are used.
9. No product damage from high evaporating temperatures.
10. Lower overall capital investment in evaporator and auxiliary equipment.
11. Simplified automatic operation, and one man control of evaporator and compressor.

Available in packaged Laboratory Model; Pilot Models; and large capacity Commercial Models. For detailed information, write

MOJONNIER BROS. CO.
4601 West Ohio Street • Chicago 44, Illinois

Mojonnier
LO-TEMP EVAPORATORS

RECENT BOOKS & PAMPHLETS, cont. . .

Subject	Summary	How to Order
Petroleum	Tables, standardized on an international basis, for the calculation of the quantities of crude petroleum and petroleum products in any of three widely-used systems of measurement. They are expected to apply to crude petroleum regardless of source and to all finished petroleum products derived therefrom regardless of method of manufacture. 525 pages.	"ASTM-IP Petroleum Measurement Tables." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $8.75.
Materials Handling	Manual gives a detailed formula for the palletized handling of refractories. Scale drawings and descriptive material covering standard wooden pallets, standard pallet load protection, carloading patterns and standard wooden end and side gates. 28 pages.	"Recommended Equipment and Procedure for the Palletized Loading and Shipment of Refractory Brick." Refractories Institute, 1801 First National Bank Bldg., Pittsburgh 22, Pa. Gratis.
Shipping	A factual appraisal of the status of the American Merchant Marine today with recommendations for its future development. 15 pages.	"What's the Score on American Shipping?" Committee of American Shipping Lines Serving Essential Foreign Trade Routes, Rm. 1300, 26 Beaver St., New York 4, N. Y.
Consultants	Describes the qualifications and activities of the members of the Association of Consulting Chemists and Chemical Engineers. Indexed by company, by location and by activity. 108 pages.	"Consulting Services." 14th Ed. Assn. of Consulting Chemists and Chemical Engineers, 50 East 41st St., New York 17, N. Y. $1.
Water	Scope, procedure and interpretation of a survey of industrial water resources of Canada.	Water Survey Report No. 1. By J. F. J. Thomas. Director, Mines Branch, Dept. of Mines and Technical Surveys, Ottawa, Canada. 75 cents.
Patents	A series of addresses given by industry executives and patent lawyers to show the important role which patents play in our economic life. 72 pages.	"The Importance of the United States Patent System." National Assn. of Manufacturers, 14 West 49th St., New York 20, N. Y.
Instruments	Proceedings of a symposium on new advances in the field of instrumentation and the instrumentation of plants typical of the Houston area. 66 pages.	"Instrumentation for the Process Industries—1952." Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa. $2.
Instruments	Background information, detailed instructions and methods for a universal laboratory instrument for electronic titrations. 40 pages.	"Volumetric Analysis with the Fisher Titrimeter." Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. $2.
Recorder Paper	For a new electrolytic electrochemical recorder paper utilizing a benzidine marking agent: electrical, physical and chemical properties; preparation. 14 pages.	NRL Report 4001. By E. J. Kohn, D. L. Venezky, R. G. Rice, F. J. Ross. Office of Technical Services, Dept. of Commerce, Washington 25, D. C. 50 cents.
Production Efficiency	Three booklets. One contains papers on organizing for improved production and cost control, the second covers motivation of the employee on today's production front and the third is on automation and other technological advances including papers on radio-active isotopes in industry and materials substitution.	Manufacturing Series, Nos. 202, 203 and 204 respectively —see summary. American Management Assn., 330 West 42nd St., New York 36, N. Y. $1.25 ea.

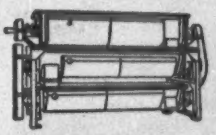
—End

We are Good Mixers

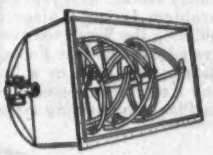
SPROUT-WALDRON EQUIPMENT and SYSTEMS for

- Continuous Mixing
- Batch Mixing
- Blending

Sprout-Waldron specializes in *all types* of equipment for intimate mixing or blending* of *all types* of dry or semi-dry materials. Sprout-Waldron's batch mixers range from midget 2½-cubic-feet units to giants of 1500 cubic feet and more. And continuous mixers can be designed with almost unlimited capacities. The wide variety of the standard units spans an equally wide field of applications. To further widen their range of uses, the standard units can be "adaptioneered" for your specific requirements. They can be made of steel, stainless steel, non-ferrous metals or wood, lined with glass or porcelain, jacketed for heating or cooling, and equipped with a wide array of agitators and other accessories. Finally, the units can be combined in series, to perform complex "unit operations."



Sprout-Waldron's wide range of styles and sizes plus "adaptioneering" methods offer you many opportunities to select a machine that will reduce mixing cycles, save labor and floor space, and cut horsepower. Why not benefit from Sprout-Waldron's vast experience in "adaptioneering" equipment for *your* processing industry? Learn how it can help to modernize *your* mixing operations, improve efficiency in *your* plant. Write to: Sprout-Waldron & Co., Inc., 15 Logan St., Muncy, Pennsylvania.



*In Sprout-Waldron's dictionary, blending is more than mixing. If you really want to blend two or more materials, thus completely losing their respective identities, Sprout-Waldron can show you how. Ask for details!

SPROUT-WALDRON

Manufacturing Engineers

MUNCY • PENNSYLVANIA

S W

MODERN EQUIPMENT FOR: Size Reduction • Mixing and Blending • Bulk Materials Handling • Product Classification • Pelleting & Cubing

315

what's NEW in Engineering

Supersonic waves pulverize rock in a new milling machine. Recently demonstrated at Reno, Nev., by its inventor Joseph Bassick, the machine turns nonmetallic rock to powder instantly. Crushing impact is delivered by sound waves. It promises to work on metals, too.

How to produce a ton of steel using only 1400 gallons of water—instead of the industry average of 65,000 gallons—was the problem facing Kaiser Engineers in building the West's only completely integrated steel mill at Fontana, Calif. For details, just drop us a line. We'll send you a reprint of a recent article about it in *Plant Engineering* magazine.

A new gadget—the pocket-sized double right angle prism—is proving a boon to many engineers in the field. Major advantage is the fact that you can look through it—straight ahead on the line of sight—and at a right angle at the same time.

"Engineering Statistics and Quality Control" is an important new book by Irving W. Burr, professor of mathematics at Purdue. Due for July publication, it is clear, unified, practical. Primary emphasis is on statistics most immediate and usable in industry.

Our new experience-record book shows Kaiser Engineers is now designing and building in such diverse fields as petroleum refining, mining, industrial and municipal waste and water treatment plants. For your copy, just write: Kaiser Engineers Division of Henry J. Kaiser Co., Kaiser Bldg., Oakland 12, Calif.

CE's Guide to *NEW TECHNICAL LITERATURE*

Whats New In . . .	How to . . .	Company . . .
Valves (A)	. . . handle saturated steam, or cold water, air and gas, or gasoline, oil, butane and propane with a line of nonmetallic disc valves. Dimensions and functions of various types. 4 p.	Lunkenheimer Co., Hox 360-U, Cincinnati 14, Ohio.
Molybdenum Disulfide (B)	. . . make use of the excellent lubricating properties of molybdenum disulfide. Graphs show pertinent properties. 4 p.	Alpha Corp., 179 Hamilton Ave., Greenwich, Conn.
Ion Exchange (C)	. . . economically solve via ion exchange the many problems in working up progressively poorer and more complex ores which must be utilized in the immediate future. Tables, charts, flow diagrams present detailed information on. 16 p.	Permutit Co., 330 West 42nd St., New York 36, N. Y.
Nickel (D)	. . . prevent product contamination and minimize equipment maintenance by using nickel plating where economics do not justify use of solid alloy or clad metal. 4 p.	International Nickel Co., 67 Wall St., New York 5, N. Y.
Ethylene Oxide (E)	. . . manufacture ethylene oxide and ethylene glycol via the new Shell Development Co. process. Simplified flow diagram, process description and a costs and utilities summary. 16 p.	Lummus Co., Rm. 359, 385 Madison Ave., New York 17, N. Y.
Pipe and Fittings (F)	. . . choose steam jacketed fittings and pipe. Portfolio contains data sheets with cross-sectional drawings and dimension tables on various models. 11 p.	Red Jacket Co., Investment Bldg., Pittsburgh 22, Pa.
Air Tubes (G)	. . . make a fully pneumatic tube system cut down on cost and complexity of transporting your laboratory samples, small tools, reports and small articles in general. How it works; what are its advantages. 4 p.	Lamson Corp., Syracuse 1, N. Y.
Titanium (H)	. . . evaluate the properties of titanium and its alloys for applications in which alloy and stainless steels and aluminum were formerly used. Numerous graphs and tables. 16 p.	Mallory-Sharon Titanium Corp., Niles, Ohio.
Asphalt Flooring (I)	. . . provide your floors with smooth tough surfaces with mastic emulsions. Explains in detail all necessary proportions for mixing along with ingredients specified for certain jobs. 4 p.	United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12, Ohio.
X-ray Analysis (J)	. . . prepare specimens and correctly apply each of the three X-ray diffraction methods: X-ray powder camera, spectrometer and spectograph equipment. 8 p.	North American Philips Co., 750 South Fulton Ave., Mount Vernon, N. Y.
Materials Handling (K)	. . . remove, lift, sort and convey either metals, lint, liquids or gases with this company's vacuum. Photographs and case histories on how the vacuum is being used in various applications, many of them in the process industries. 20 p.	Spencer Turbine Co., Hartford 6, Conn.
Peroxygen Chemicals (L)	. . . appraise the properties of these chemicals and turn them to their best use. 20 p.	Buffalo Electro-Chemical Co., Buffalo 7, N. Y.
Evaporator (M)	. . . process liquids, slurries and gases in one pass, in a few seconds, by continuous process with this company's turba-film evaporator. Fully labled cutaway drawing; flow chart. 12 p.	Rodney Hunt Machine Co., 43 Vale St., Orange, Mass.
Chemicals (N)	. . . make use of a new experimental chemical, N-phenylmaleamic acid. Physical and chemical properties, potential applications. 12 p.	American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.
Pump (O)	. . . handle extreme ranges of temperatures, pressures and volatility with this company's single-suction, single-stage type pump with center line mountings. Photographs, construction details, dimensions. 8 p.	Allis-Chalmers Mfg. Co., 1147 South 70th St., Milwaukee 1, Wis.
Compressors (P)	. . . transfer liquefied gas with compressors specially designed for this service. Construction of the unit shown by a sectional view; all important operational and construction features are fully captioned. 4 p.	Ingersoll-Rand Co., Dept. T-30, 11 Broadway, New York 4, N. Y.
Tar Bases (Q)	. . . use these pyridine bases in such industries as pharmaceuticals, petroleum, textiles. Sections on properties, typical reactions, hazards and methods of handling, test methods, references. 96 p.	Barrett Div., 40 Rector St., New York 6, N. Y.
Filters (R)	. . . insure a positive seal through the use of this company's model ECD filters which incorporate a new principle of double closure. 2 p. Another bulletin covers model EU, an all-purpose filter meeting requirements from coarse pre-filtration to ultra fine filtration. 2 p.	Ertel Engineering Corp., Kingston, N. Y.

(Continued)

Find out why
"Designed by Kaiser Engineers"
means

low operating costs

Send today for our new 32-page experience-record book. For twenty-five years, Kaiser Engineers has been known for its ability to design and build plants with low operating costs.

Current examples of this ability are to be found in such diverse jobs as a municipal water treatment plant, a 473,200 kw power generating plant, a catalytic cracking plant, a cement plant, a tin plate mill and an ore beneficiation plant.

Consult Kaiser Engineers early to find out how our wealth of experience and diversity of skills can solve your design, engineering or construction problems whether budgeted at thousands or millions of dollars.

kaiser engineers...*for low operating costs*

HOME OFFICE: KAISER BUILDING, OAKLAND 12, CALIFORNIA

ENGINEERS • CONTRACTORS

KAISER ENGINEERS DIVISION OF HENRY J. KAISER COMPANY: OAKLAND • NEW YORK • PITTSBURGH • LOS ANGELES • WASHINGTON, D. C. • (CABLE: KAISENGS)

if this is what you need in piping

✓exceptional abrasion resistance

✓maximum resistance to corrosive oils, greases, solvents, acids and chemicals

✓low degree of swell and permeability to hydrocarbon solvents

*a development of The Dow Chemical Company

Supplied in either fabricated light gauge steel or standard wall. Available in 10' and 20' regular lengths or custom fabricated to your requirements . . . diameters 8" thru 48". Fittings in standard and special designs for all diameters. For catalog and additional information write Dept. C.

EST. mpc 1869

MICHIGAN PIPE COMPANY

Bay City • Michigan

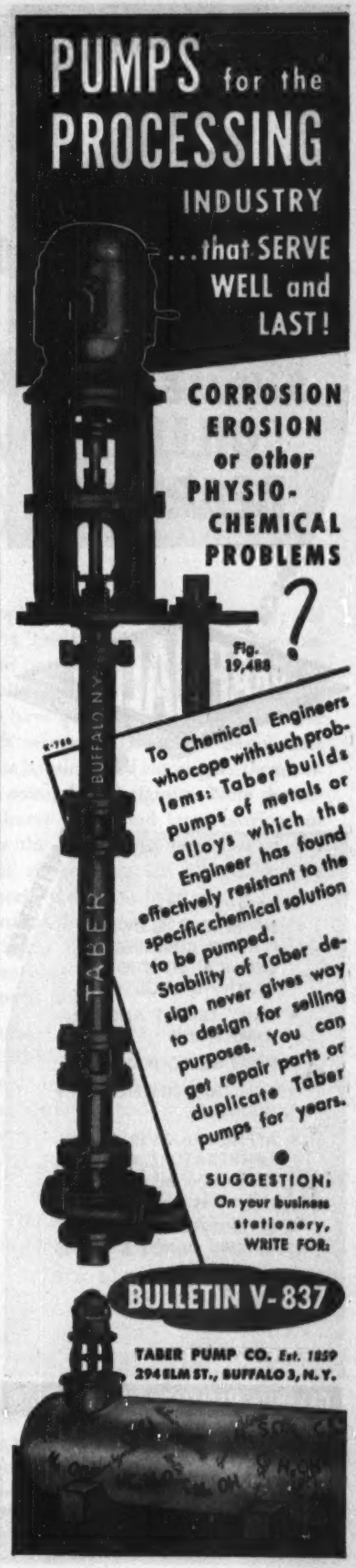
Manufacturers of Wood-Stave, Saran Rubber-Lined, Stainless Steel and Monel Piping

New Technical Literature, *cont.* . .

Whats New In . . .	How to . . .	Company . . .
Plastic (A)	. . . use to advantage the unique combination of electrical, mechanical and chemical properties of Kel-F polymers. Data on its resistance to more than 100 specific chemical substances. 6 p.	M. W. Kellogg Co., P.O. Box 469, Jersey City 3, N. J.
Teflon (B)	. . . deal with design considerations for the best use of Teflon. Its applications and possibilities. Tables, charts and sketches. 8 p.	Polymer Corp. of Pennsylvania, Reading, Pa.
Flotation Agents (C)	. . . determine the functions flotation agents serve. 1953 edition of this company's booklet on flotation. Descriptions of the flotation process, a group of mathematical formulas widely used in the operation and control of modern ore dressing mills. 20 p.	Hercules Powder Co., Wilmington 99, Del.
Instruments (D)	. . . continuously record viscosity of resins and polymers in large reactors at processing temperatures. Describes results obtained with this company's Viscometer and with other competitive equipment. 14 p.	Norcross Corp., 247 Newtonville Ave., Newton 58, Mass.
Pipe (E)	. . . make the best use of pipe, fittings and tubing made of a rigid polyvinyl chloride thermoplastic product. 2 p.	Alpha Plastics Inc., 14 Northfield Rd., West Orange, N. J.
Consultant (F)	. . . take advantage of the tools this company has to offer in the fields of management counsel, plant and architectural engineering. 8 p.	Lester B. Knight & Associates, 600 West Jackson Blvd., Chicago 6, Ill.
Pumps (G)	. . . select the proper vacuum pump for your requirements. A paper by Richard B. Lawrance called "High Vacuum Vapor Pumps" discusses many of their important characteristics. Describes a practical means of correlating these factors for industrial applications.	National Research Corp., 70 Memorial Dr., Cambridge, Mass.
Conveyors (H)	. . . select truss and channel frame conveyors. Detailed selection tables, layout diagrams, photographs and descriptions of various products. Third printing of this company's catalog, the section on channel frame conveyors is new. 48 p.	Barber-Greene Co., Aurora, Ill.
Storage Systems (I)	. . . reduce operating costs by providing sufficient storage capacity for raw ingredients, semi-processed or finished materials. Pictures of how industrial silos are used in various process industries. 12 p.	Marietta Concrete Corp., Marietta, Ohio.
Insecticide (J)	. . . use and handle a new systemic insecticide, octamethylpyrophosphoramide. Sections on chemical and physical properties, effectiveness, application methods, application recommendations, suggestions for experimental applications, sample OMPA formulations, storage and handling. 12 p.	Monsanto Chemical St. Louis 4, Mo.
Resin Equipment (K)	. . . procure and have erected resin plants from pilot to full scale units. Detail on design problems such as materials of construction, instrumentation, agitation and methods of heating and cooling. 24 p.	Blaw-Knox Co., Process Equipment Dept., Farmers Bank Bldg., Pittsburgh 22, Pa.
Conveyors (L)	. . . satisfy your needs for gravity wheel conveyors, gravity roller conveyors, gravity wheel and roller accessories and power belt conveyors. Photographs and descriptions with exact specifications.	Speedway Conveyors, Inc., 1223 Niagara St., Buffalo 13, N. Y.
Ferrocyanides (M)	. . . make use of sodium and potassium ferrocyanides and of hydroferrocyanic acid. Summary of the known physical and chemical properties.	American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.
Acrylic Fiber (N)	. . . take advantage of the features of this company's new acrylic fiber, Acrilan. What its characteristics mean to the textile manufacturer and to the consumer. Flow chart shows the 14 basic steps involved in its manufacture. 16 p.	Chemstrand Corp., Decatur, Ala.
Resins (O)	. . . obtain a material which will withstand the temperature range demanded by practical subminiaturisation techniques. Characteristics and applications of this company's casting resins for electrical work. 8 p.	R. S. Aries & Associates, 400 Madison Ave., New York 17, N. Y.
Wire and Cable (P)	. . . choose from a line of electrical wires and cables which caters to the chemical and petroleum industries. 76 p.	United States Rubber Co., 1230 Ave. of the Americas, New York 20, N. Y.
Process Equipment (Q)	. . . get your fertilizer plant design done by a consulting firm with 35 years of experience. Flow sheets and photographs show the type of work they've done. 6 p.	Dorr Co., Engineers, Barry Pl., Stamford, Conn.
Plasticizer (R)	. . . extract maximum utility from a new monomeric plasticizer, di-iso-octyl azelate. 2 p.	Emery Industries, Inc., Dept. 5, Carew Tower, Cincinnati 2, Ohio.
Chemicals (S)	. . . evaluate the line of chemicals produced by this company by combining chlo-	Hooker Electrochemical Co.,

Whats New In . . .	How to . . .	Company . . .
	rine, caustic soda or hydrogen with such raw materials as benzene, toluene, paraffin. Physical data, uses, shipping containers and regulations for each. 24 p.	Niagara Falls, N. Y.
Instruments (A)	. . . select photoelectric and electronic measuring instruments. Photographs, prices, applications of the various members of the line. 4 p.	Photovolt Corp., 95 Madison Ave., New York 16, N. Y.
Process Equipment (B)	. . . recover fatty acids from vegetable oils processing wastes with this company's flotation unit, model 25. Sketch shows design details and dimensions. 8 p.	F. S. Gibbs, Inc., 2300 Washington St., Newton Lower Falls 62, Mass.
Lacquer Emulsions (C)	. . . increase uses for lacquer emulsions. New developments in emulsifying agents and in emulsifying and formulating techniques. 12 p.	Hercules Powder Co., Wilmington 99, Del.
Safety (D)	. . . keep your safety program in good shape by utilizing the facilities of the National Safety Council. Recommended books, educational material, equipment. 52 p.	National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.
Research Consultant (E)	. . . turn ideas into dollars. Describes and pictures this company's industrial research and development facilities. 12 p.	Commonwealth Engineering Co. of Ohio, 1771 Springfield St., Dayton, Ohio.
Instruments (F)	. . . supply yourself with laboratory instruments. Among the equipment covered: a sample changer, equipment for detection and measurement of radioactivity.	Nuclear Instrument & Chemical Corp., 229 West Erie St., Chicago, Ill.
Rubber Lining (G)	. . . take advantage of rubber lining for steel tanks, drums, pipes, valves, fittings and pumps. Tables give resistance of the lining to inorganic acids, salts and alkalies, organic materials and a wide group of miscellaneous materials. 8 p.	Metalweld, Inc., Scotts Lane & Abbotsford Ave., Philadelphia 29, Pa.
Glucosates (H)	. . . solve your problems of scale and corrosion control with glucosates. Specific uses of various members of the line.	D. W. Haering & Co., Harlandale Sta., San Antonio, Tex.
Isotopes (I)	. . . obtain radioisotopes and stable isotopes for use in medicine, agriculture, industry and science. Catalog lists over 275 isotopes together with prices and descriptive material. Available at $1 per copy.	Carbide and Carbon Chemicals Co., Oak Ridge National Laboratory, Stable Isotope Research and Production Div., P.O. Box P, Oak Ridge, Tenn.
Materials Handling (J)	. . . save manpower, resist corrosion and gain sanitary advantages through the use of aluminum in materials handling equipment. Six articles reporting the results of a survey covering more than 50 manufacturers and users. 20 p.	Aluminum Assn., 420 Lexington Ave., New York 17, N. Y.
Pumps (K)	. . . solve difficult solids and acid handling problems with this company's line of virtually glandless pumps. Capacity tables, performance charts, assembly drawings and parts lists. 16 p.	Galigher Co., 545 West Eighth South, Salt Lake City, Utah.
Materials Handling (L)	. . . receive, transport through processing, and ship material in boxes. More than 25 photos depict typical applications in the logistics of boxes. 8 p.	Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.
Flooring (M)	. . . produce long life repairs and easily and quickly patch or resurface worn concrete floors with iron-asphalt patching material. 6 p.	Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio.
Packaging Equipment (N)	. . . improve your shipping procedures by exploiting steel strapping to its fullest. Illustrations strapping tools and equipment for various applications. 15th ed.	Signode Steel Strapping Co., 2600 North Western Ave., Chicago 47, Ill.
Glass Apparatus (O)	. . . supply yourself with standard or special glass apparatus. Catalog contains three sections: standard scientific glass apparatus, special scientific glass apparatus, scintillation crystals and liquids, special chemicals gases and accessories and thin films. Prices, descriptions, illustrations. 32 p.	Wakefield Industries, Dept. FP-3, 5108 West Grove St., Skokie, Ill.
Instruments (P)	. . . do glycerine analyses three times faster with this company's automatic titrator. 1 p.	Beckman Instruments, Inc., South Pasadena 1, Calif.
Piezo-Electric Materials (Q)	. . . discover where your needs fit into the broad application range of piezotronics. 24 p. Another booklet compares general properties of piezo-electric materials, describes their basic behavior, lists electronic circuit applications and electronic circuit considerations, gives basic electrical, mechanical and electro-mechanical properties and equivalent circuit data. 32 p.	Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio.
Instruments (R)	. . . measure mechanical pressures or compressive loads even in very limited space with this company's gage. Photographs show the various jobs it can do. 4 p.	W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.

(Continued)


PUMPS for the PROCESSING INDUSTRY ...that SERVE WELL and LAST!
CORROSION EROSION or other PHYSIO-CHEMICAL PROBLEMS ?
Fig. 19,488
TABER
BUFFALO N.Y.
To Chemical Engineers who cope with such problems: Taber builds pumps of metals or alloys which the Engineer has found effectively resistant to the specific chemical solution to be pumped. Stability of Taber design never gives way to design for selling purposes. You can get repair parts or duplicate Taber pumps for years.
SUGGESTION: On your business stationery, WRITE FOR:
BULLETIN V-837
TABER PUMP CO. Est. 1859
294 ELM ST., BUFFALO 3, N. Y.

SPECIFY GRAPHALLOY WITH CONFIDENCE

- OPERATE DRY or SUBMERGED IN DYES, PLATING, CLEANING & CHEMICAL SOLUTIONS, GASOLINE, FOODSTUFFS
- TRULY OILLESS AND SELF-LUBRICATING
- EXTREMELY DURABLE
- CONSTANT COEFFICIENT OF FRICTION
- APPLICABLE OVER A WIDE TEMPERATURE RANGE—even where oil solidifies or carbonizes
- EXTENSIVELY USED IN CONVEYORS, PUMPS & OVENS
- ROTATING SEALS OF GRAPHALLOY ARE UNEXCELLED

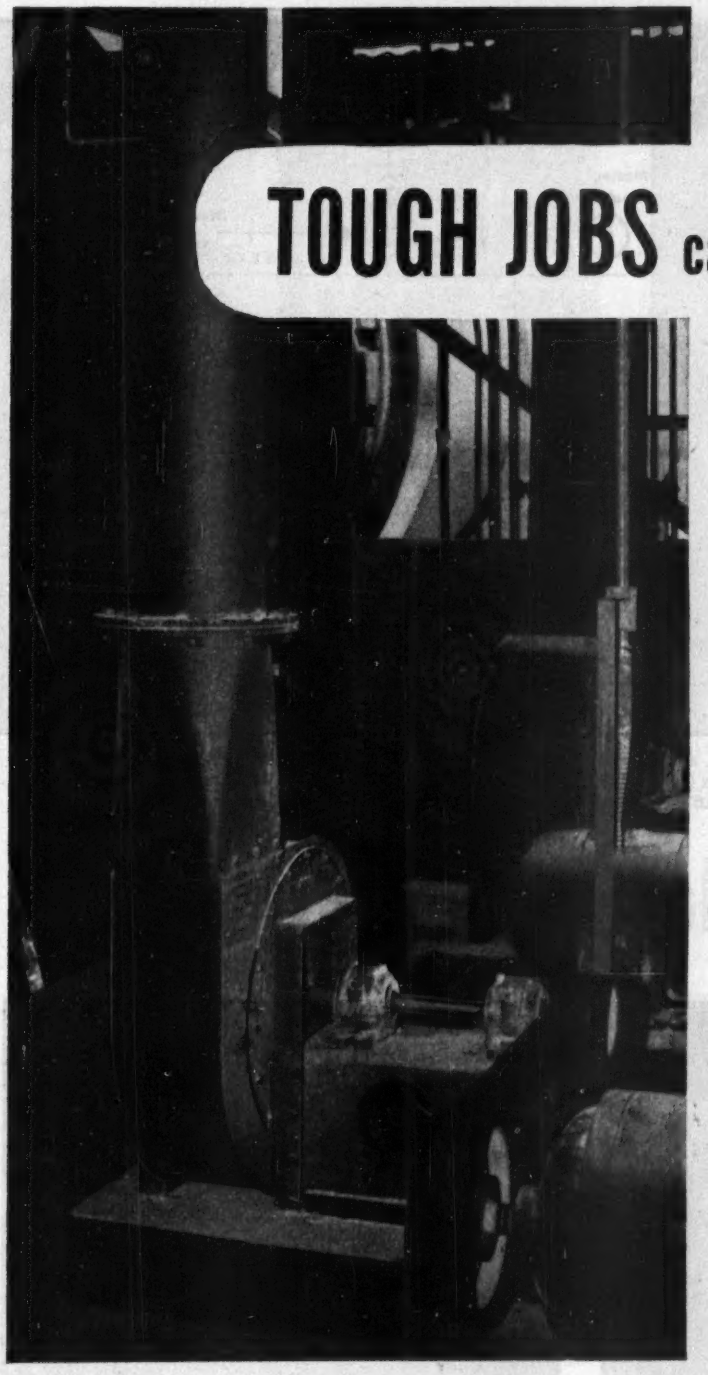
GRAPHITE METALLIZING CORPORATION
1024 NEPPERHAN AVENUE • YONKERS, NEW YORK
Please send data on Graphalloy SUBMERGED OILLESS BEARINGS.

NAME & TITLE
COMPANY
STREET
CITY ZONE STATE

New Technical Literature, cont...

What's New In	How to . . .	Company . . .
Packaging (A)	. . . make the best use of polyethylene bags and liners. Properties and recommended applications. 4 p.	Plastic Packaging Co., 730 North Franklin St., Chicago 10, Ill.
Instruments (B)	. . . determine practically all the metallic elements and some nonmetals as well with this company's flame photometry. Evolution, design and utility of flame photometry in routine laboratory analysis, research and industrial process control. 8 p.	Beckman Instruments, Inc., South Pasadena 1, Calif.
Materials Handling (C)	. . . apply materials and compounds by choosing from a line of power-operated pumps, Spray pole and Flo-guns, hose and accessories. Photographs showing applications, selection chart, cutaway drawings. 12 p.	Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis 20, Mo.
Speed Reducers (D)	. . . find the proper type and size Rating tables, dimensions, blueprints of various of gear speed reducer to meet your requirements. models. 58 p.	D. O. James Gear Mfg. Co., 1140 West Monroe St., Chicago 7, Ill.
Manifolds (E)	. . . find manifolds for your cylinders of compressed gas. 4 p.	The Matheson Co., East Rutherford, N. J.
Laboratory Equipment (F)	. . . meet your laboratory planning problems with furniture, equipment and accessories chosen from this company's line. Illustrates an extensive line of the various items needed for the modern laboratory based on sectional and interchangeable units. 180 p.	Metalab Equipment Corp., Hicksville, L. I., N. Y.
Ammonium Thiocyanate (G)	. . . use it in agriculture, textiles, paper, plastics, rubber, adhesives, protective coatings, metals treatment and metallurgy and as an intermediate for other chemicals. 20 p.	J. T. Baker Chemical Co., Industrial Chemical Div., Phillipsburg, N. J.
Control Relays (H)	. . . sequence multimotor machines, to operate solenoids and to obtain pilot control from pushbutton stations of electrical circuits associated with such functions as temperature and pressure regulation with this company's Type N control relay.	Westinghouse Electric Corp. Box 2099, Pittsburgh 30, Pa.
Chemicals (I)	. . . apply a line of detergents, wetting agents, emulsifiers, brighteners, sequestrants and dyeing assistants in such industries as paper, rubber, textile and synthetic fibers. 28 p.	Antara Chemicals Div., 435 Hudson St., New York 14, N. Y.
Metal Hose (J)	. . . handle various kinds of liquids, gases, solids and semi-solids with this company's flexible hose assemblies. 6 p.	Flexonics Corp., 1317 South Third Ave., Maywood, Ill.
Packaging (K)	. . . utilize automatic packaging equipment. What's available, how it works. Case history of how its used in a powdered milk plant. 6 p.	Pneumatic Scale Corp., Quincy 71, Mass.
Chemicals (L)	. . . fill your needs from a line of chemicals catering to the rubber, paint, printing ink, plastic, paper, ceramics, leather and drug and cosmetics industries. Sixth edition of this catalog. 106 p.	Witco Chemical Co., 260 Madison Ave., New York 16, N. Y.
Scale (M)	. . . accurately control production input and output by automatic, continuous weighing, in transit, of raw, intermediate and finished materials and products. 8 p.	Sintering Machinery Corp., Sinter Ave., Netcong, N. J.
Thermometer (N)	. . . avoid eye strain and head craning with stainless steel thermometer featuring large dials. Performance data, prices. 4 p.	W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.
Steel Castings (O)	. . . take advantage of the reliability, strength and versatility of steel casting in any one of 100 different industries. Properties, specifications, design, joining, heat treating and inspection procedures. 16 p.	Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio.
Safety Equipment (P)	. . . be sure your current actuated protective devices are really protecting. Describes a new instrument that makes it possible to check these devices safely and without overloading the equipment being protected. 12 p.	Multi-Amp Corp., Harrison, N. J.
Electroplating Supplies (Q)	. . . assure yourself of the requisites of a good soluble anode by choosing from this company's line. Specifications and recommended applications for various types of anode bags, diaphragms as well as anodes. 16 p.	Hanson-Van Winkle-Munning Co., Matawan, N. J.
Adhesives (R)	. . . join woods with bonds as strong as the wood itself over all conditions of temperature. Resorcinol-formaldehyde adhesives —types, properties, specific applications. 8 p.	Koppers Co., Koppers Bldg., Pittsburgh 19, Pa.
Stainless (S)	. . . supply your needs from a complete line of stainless steel plates, forgings, sheets, tank heads and flanges. 4 p.	G. O. Carlson, Inc., 504 Marshalton Rd., Thorndale, Pa.
Valves (T)	. . . relieve and equalize excessive pressure with valves having only one moving part. Bulletin also describes check valves and rotary pressure joints. 6 p.	Anco, Inc., One Baker St., Providence 5, R. I.

—End



TOUGH JOBS call for "Buffalo" FANS

like these rugged INDUSTRIAL EXHAUSTERS

Supplying primary and secondary air for a lime kiln is a job calling for constant pressure and twenty-four hour reliability. "Buffalo" Industrial Exhausters have proven themselves ideal for such service. All-welded heavy steel plate housings and rotors give them ample strength and rigidity. Note the extra-heavy shafts and large bearings to take the torque and thrust. Available with either Material Wheels or Air Wheels, these fans have earned a reputation as the "work fans of industry", on every type of exhaust and pneumatic conveying job, as well as mechanical draft.

"Buffalo" Industrial Exhausters may be had in high-heat models, rubber-lined, coated or alloy construction for handling corrosive and/or abrasive atmospheres.

For fans that will perform as rated, and that will stand upon the job, specify "Buffalo". Why not write for recommendations on *your* air application?

"Buffalo" FIRST FOR FANS

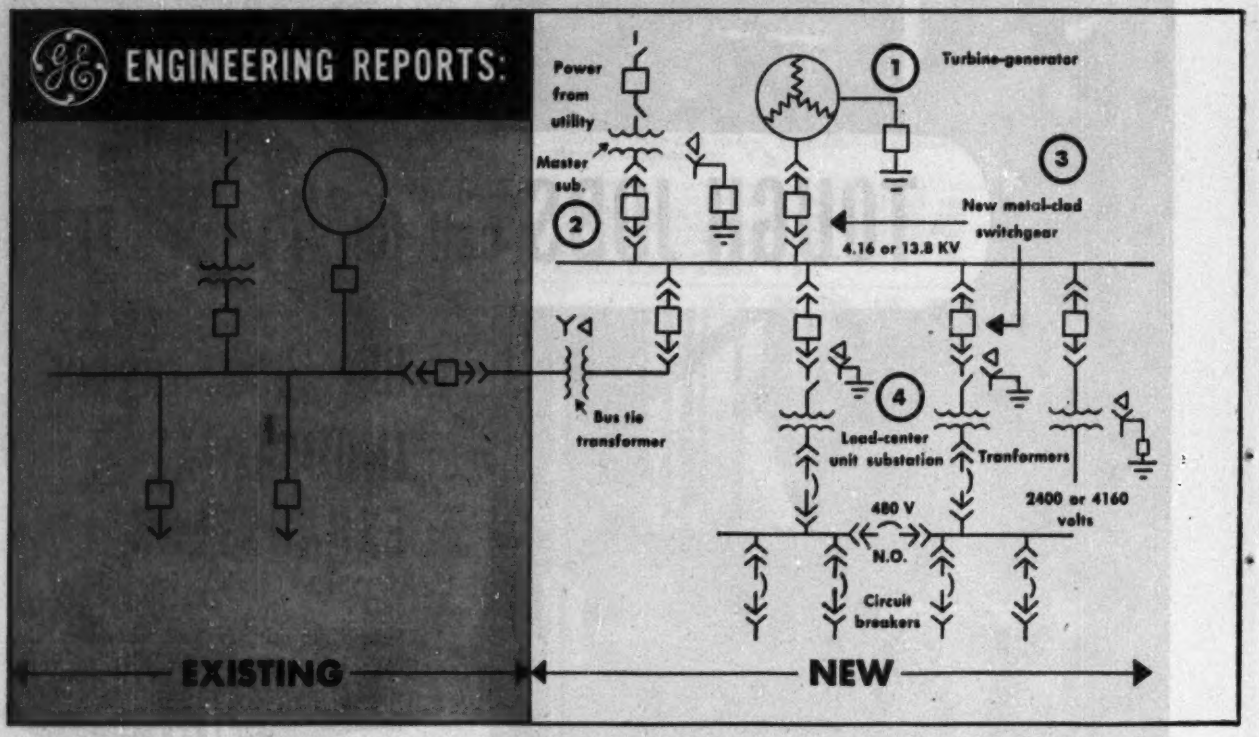
BUFFALO FORGE COMPANY

501 BROADWAY BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

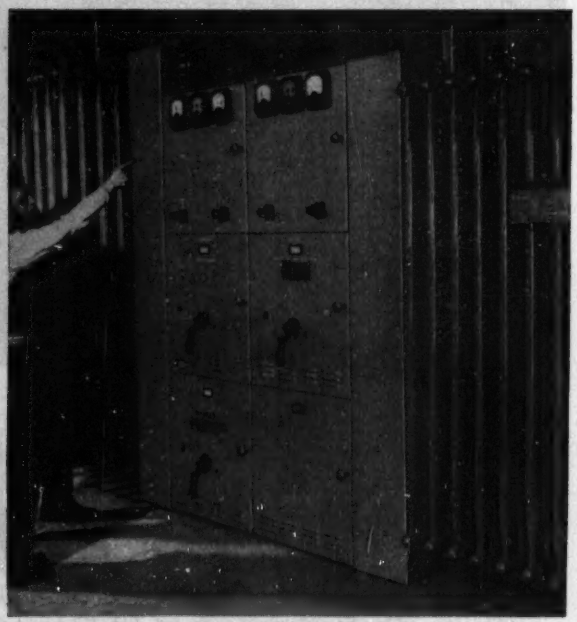
VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING



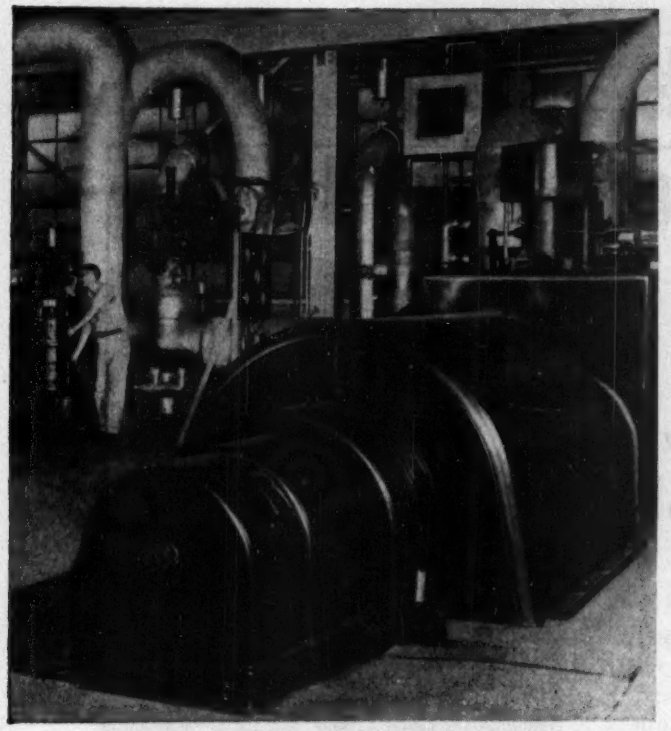
EXPANSION TO HIGH VOLTAGE IS SIMPLE. Here, a processing plant is extended by adding new power sources (1) or (2) at high voltage and connecting a high-voltage bus to an existing low-voltage bus through a transformer. Existing system is left as is; new high voltage "back-bone" transmits power through switchgear (3) to load centers (4).

High-voltage power distribution

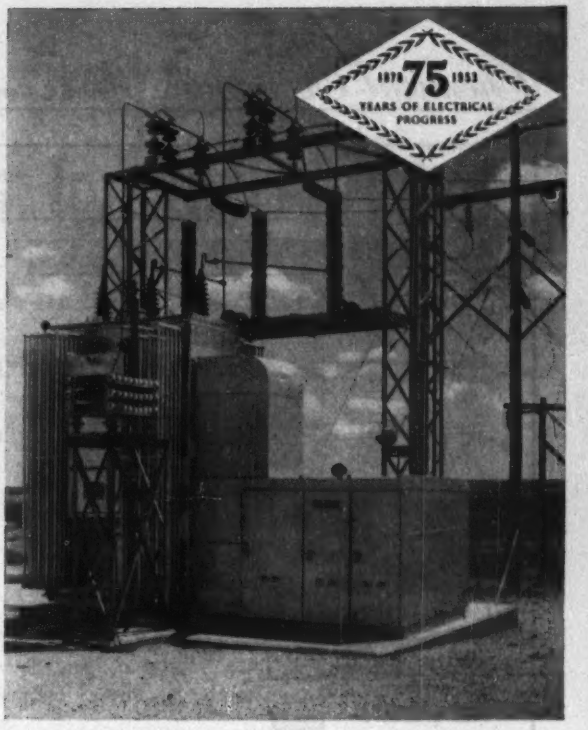
3. TO SAFEGUARD PERSONNEL, high-voltage G-E switchgear is metal-enclosed. There are no exposed live parts—switchgear can be located in work areas, close to machines.



4. FLEXIBILITY FOR CHANGING LOADS is provided by G-E double-ended load-center unit substation. Ratings, circuit arrangements are available to meet specific requirements.



1. **BY-PRODUCT POWER**—in plants using process steam—can be supplied economically by G-E turbine-generator. High-voltage generation means flexibility for future load growth.



2. **EASY TO INSTALL**—G-E master unit substation brings purchased primary power into plant at high voltage. It's a packaged unit—helps meet today's need for quick expansion.

system simplifies plant expansion

Engineering problems and installation costs reduced, production kept continuous by G-E "building-block" distribution equipment

The mushrooming growth of chemical processing plants continues. Power systems must be capable of expansion—in a hurry—to keep up.

G-E high-voltage load-center distribution systems are the answer. General Electric high-voltage "packaged power" units can be used to form new electrical load-center systems. Each standardized package or "building block," is a complete, factory-assembled unit. Each is ready for operation right after it is delivered. Units can be added step by step, as the plant grows, to keep costs low and processing continuous.

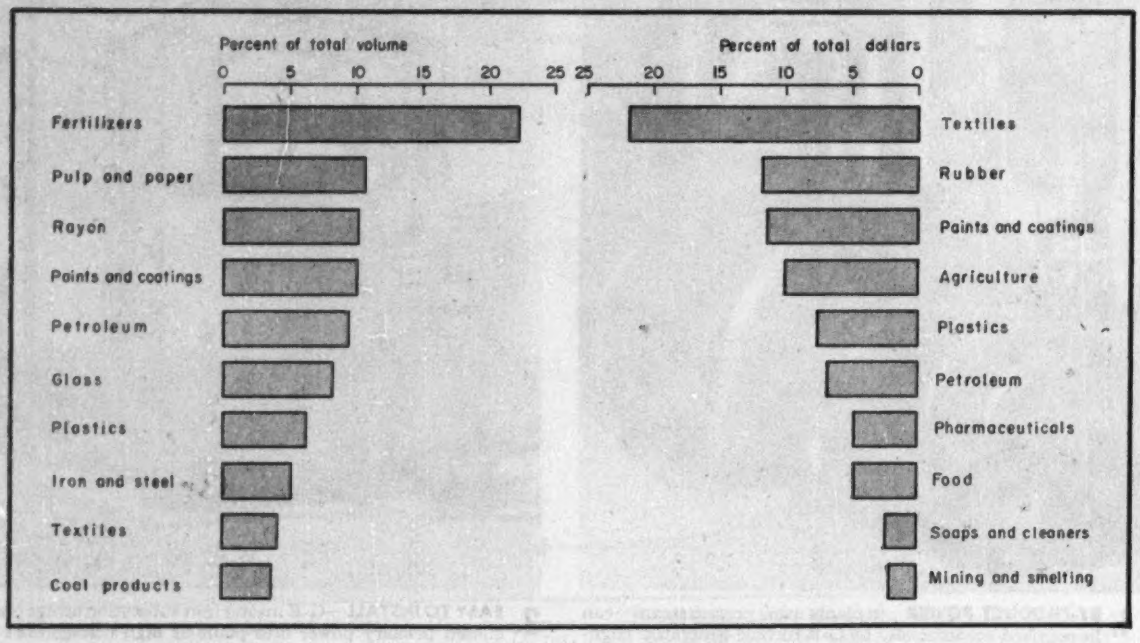
How a high-voltage system saves. High-voltage power, carried to load centers, saves copper, reduces voltage drop, improving equipment performance. The lower currents are more easily isolated—assuring production continuity. Cost of future expansion will be less.

But suppose you have a low-voltage system . . . Combining it with a high-voltage system is simple—*and can be done at little or no extra cost!* It merely requires the addition of a bus-tie transformer between buses. Then, as your plant expands, the high-voltage system can be introduced as though the low-voltage system did not exist.

Planning an ideal distribution system. To guide you in a modernization or expansion program you need an over-all power system plan. See the new full-color film, "The Vital Link"—part of G.E.'s new *More Power To America* program on modern industrial power distribution systems. Contact your G-E Apparatus Sales Representative, or write to General Electric Co., Schenectady 5, N. Y. 663-44

Engineered Electrical Systems for Chemical Plants

GENERAL ELECTRIC



Top Ten Consumers on the Chemical Hit Parade

Fertilizers (by volume) and textiles (by value) continue to hold down the top spots. Steel is still in eighth place despite last year's strikes.

The chemical industry has moved right into the American home. Measure chemical sales by the ton or by the dollar and either way you see how close the alliance is between industry and consumer.

This means added strength and stability for the industry. The most uncertain field of business activity today is the production of capital goods, but nevertheless, the continuing trend is for an increasing amount of chemical output to flow to consumers and consumer goods industries. For consumers, of course, this shift means more and better products.

▶ **Sales by Volume**—The ten biggest consumers of chemicals haven't changed much since the last time *Chemical Engineering* analyzed the facts (May 1951). Then, as now, fertilizers led the pack. The volume of chemicals used to produce fertilizers is more than twice that consumed in any other industry. And as long as the production and consumption of food stay high, the output of nitrogen, phosphate and potash fertilizers will continue to rise.

Pulp and paper ranked second last year as against third in 1951. Industry specialists say high industrial production and brisk retail sales explain the good business enjoyed by pulp and paper producers in 1952. But these same observers anticipate a buyers' market in pulp and paper later this year and for the year as a whole it seems likely that chemical consumption will stay at about 1952 levels.

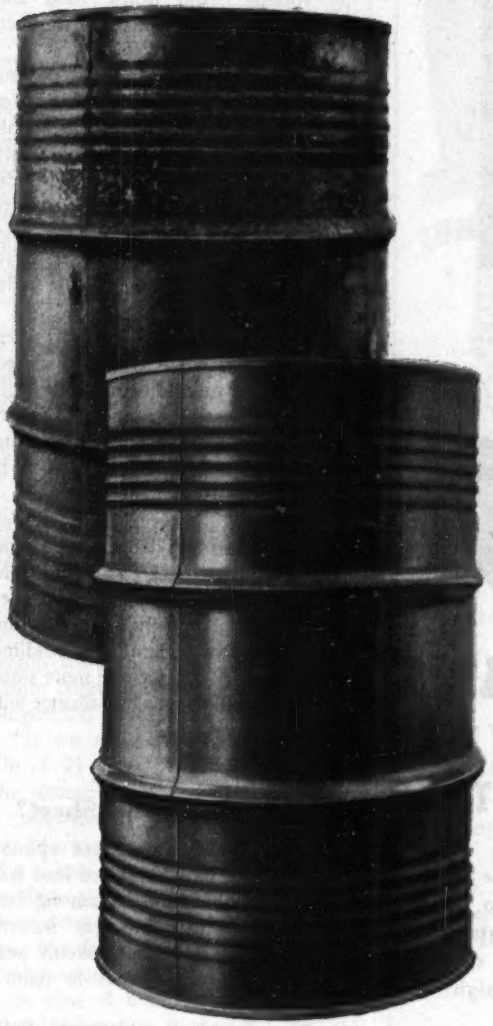
Rayon skipped into third place—it was fourth in 1951—as a consumer of chemicals. The volume used in rayons was just a shade more than that used to produce paints and varnishes. Despite a continuation of feverish building activity last year, paints and varnishes skidded from second to fourth place.

From petroleum through coal products, the order of chemical use—on a volume basis—is unchanged since early 1951. The fact that iron and steel clung to eighth place—despite the protracted strikes—is a tribute to the speed with which the industry roared back into peak production once the dispute was settled.

▶ **Sales by Value**—When you measure chemical consumption on a dollar basis, the industry-consumer tie is again apparent. Textiles take more than 20 percent of the dollar value of all chemical sales, about twice as much as the nearest rival. These purchases include the chemicals needed for the production of man-made fibers as well as those used to treat natural fibers.

Rubber producers, paint manufacturers and farmers spend just about the same amount on chemicals. But despite the fact that farm purchases include both insecticides and fertilizers, the farm ranks only fourth in dollar chemical consumption as against its undisputed leadership in a volume comparison. The reason: Farm chemicals are high-bulk, low-priced chemicals. (Continued)

NOW! Better Steel Drums ---Better Protection for Your Products



ORDINARY PAINTED DRUM *(shown at top)* after exposure to weather for one year is badly rusted. Rust was very apparent after only *one week.*

U·S·S RUST-INHIBITED DRUM *(in foreground)* also exposed to weather for a year. There was absolutely no rust on this drum at the end of the test.

U. S. Steel Products introduces a brand-new cleaning process which completely cleans drums of contaminating materials . . . *inhibits rust formation.*

UNITED STATES STEEL PRODUCTS is pleased to announce the development of a new cleaning and finishing process that represents a significant advance in the quality of all steel drums.

The U·S·S process not only cleans drums completely of mill scale and other contaminating materials such as grease, dirt and soot, but also retards rust and corrosion. In addition, the process provides an ideal surface for finishes.

This new process cleans the drums completely . . . doesn't just cover the dirt, scale and rusting areas, leaving unprotected spots when the drum is banged around in handling. You see . . . our rust-inhibited coat is applied just prior to final assembly of the component parts . . . after the parts have been formed, and completely cleaned and descaled; there is no flaking problem.

The complete treatment consists of (1) cleaning the drum parts, completely, (2) removing mill scale and (3) applying a phosphate treatment to the steel surface, which results in a phosphate coating combining with the steel surface . . . inhibiting rust formation on both the inside and outside of the drum and forming an ideal surface for exterior and interior finishes.

• • •

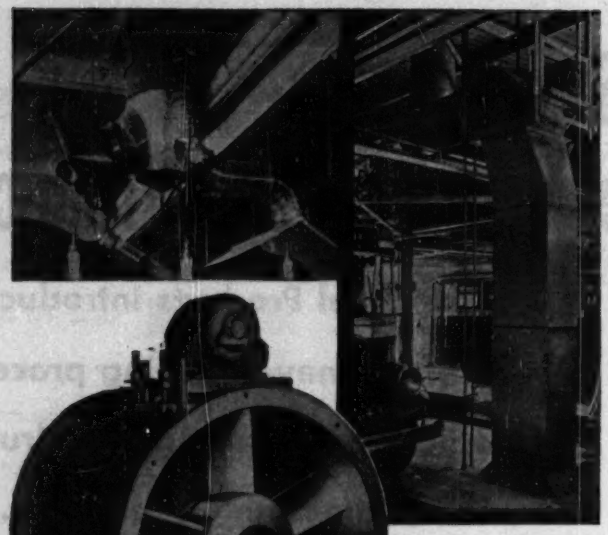
United States Steel Products fabricates Stainless, Galvanized, Tinned, Painted and Decorated drums and pails. Furnished in capacities from 2½ to 110 gallons, with a variety of fittings and openings to fit your particular requirements.

"It's Better to Ship in Steel"

UNITED STATES STEEL PRODUCTS
DIVISION
UNITED STATES STEEL CORPORATION
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Los Angeles and Alameda, Calif. • Port Arthur, Texas • Chicago, Ill. • New Orleans, La. • Sharon, Pa.

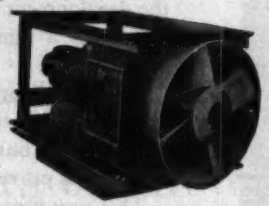
USS

UNITED STATES STEEL



Upper left: Wingfoil Straight-Line Duct Fan in Textile Mill. Upper right: Wingfoil Elbow Type Duct Fan exhausting gases in a Garage.

Wingfoil Straight-Line Duct Fan



Wingfoil Elbow Type Duct Fan

WINGFOIL DUCT FANS

DELIVER LARGE AIR VOLUMES WITH LOW POWER CONSUMPTION

The WINGFOIL Axial Flow Duct Fan, in either elbow or straight line type, is a compact, economical fan, designed to operate against static pressure. Both types have the motor outside the casing, unaffected by hot or dirty gases. Light weight, compact, easily handled, they may be inserted, as elbow or straight section, into a line of duct.

Write for Bulletin F-10

Wing

L. J. Wing Mfg. Co.

170 Vreeland Mills Road
Linden, N. J.
Factories:
Linden, N. J. and Montreal, Can.

Textile chemicals, by contrast, are quite expensive and therefore textiles lag when consumption is classified by volume, but lead when dollar value is the criterion.

Plastics, too, are more important on a dollar comparison than they are by volume. And drugs, food and detergents also make the list when dollars are the yardstick.

▶ **What It Means**—Add it all up and you see that the big purchasers of chemicals are the firms that supply us all with food, with clothes, with drugs, with cleaners. As long as demand for these essentials remains firm, chemicals have an assured market. And high income and high savings put a good sturdy floor under consumer demand.

No economist anticipates a severe business letdown. Most do expect some period of readjustment, though, as the nation shifts from a defense to a peacetime economy. But any pause in business activity is expected to be both temporary and modest.

Chemicals, however, are in an exceptionally strong defensive position. The industry has an impressive variety of new divisions and new products. But equally important—and this is the story behind the headlines—the industry has become more stable by virtue of its new close alliance with the consumer.

Outlook for Lead—Will It Really Be Short?

Two seemingly divergent opinions on the economic future of lead have been causing confusion among both consumers and producers recently. One appears to be outspokenly pessimistic; the other seems to paint a rosy picture.

The President's Materials Policy (Paley) Commission forecasts a growing lead shortage for at least the next 25 years, probably accompanied by a severe price rise. Ethyl Corp. vice president, Joseph A. Costello, however, says that adequate supplies of lead will almost certainly be forthcoming to meet indicated future increases in demand.

But are these statements really as different as they seem? Let's examine their supporting arguments.

▶ **Paley Sees a Shortage**—Although the demand for lead is expected to grow only about 60 percent as fast as the

total national output of goods and services, we will still need about 200,000 tons more lead per year by 1975 than was produced in 1950, according to the Paley report. And we just haven't got it.

The big hitch is in domestic production. In 1950, U.S. mines produced about 430,000 tons of lead. The best hope is that this figure won't drop by more than about 50 percent by 1975. For the years after 1975, the outlook is even worse.

This means that the U.S. will have to rely more and more on imports, maybe as much as 60 percent more—by 1975—than the 565,000 tons imported in 1950. To satisfy this need, the rest of the free world's lead-mining facilities will have to double. Foreign output can certainly be substantially increased, the commission says, but not that much.

▶ **Others Say No**—But that's not the whole story. While endorsing the overall objectives of the Paley report, Mr. Costello, in a recent address before the Lead Industries Association, said it was unfortunate that some of the Commission's estimates of lead demand in 1975 have been mistaken for flat predictions.

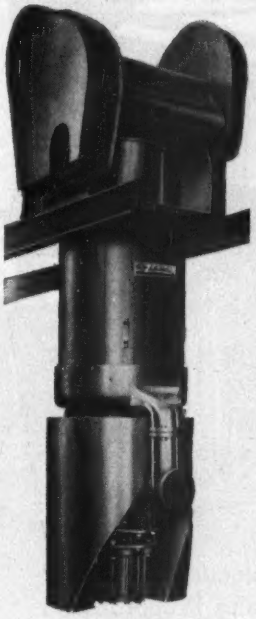
Actually, he explained, these estimates make no allowance for technological changes and other economic factors which are bound to influence future consumption. As an example, he pointed to storage batteries.

"If we assume an average battery life of 2½ years by 1975, instead of the present 2 years, and if we assume a reduction in average lead content per battery from 23 to 20 lb., which also seems conservative, it is possible to show a 1975 demand for lead in the battery field that is some 200,000 tons less than that listed by the Paley Commission."

In view of these and other similar considerations, it is apparent that a 25-year forecast for lead can't be made with any real degree of accuracy. All that can be done is to indicate the general trend. There is little doubt, though, that normal economic forces will always work toward bringing supply and demand into balance.

Costello agrees, too, that even if demand decreases from the 1950 level, more foreign lead will be needed. U.S. consumers, he said, must accept the responsibility for encouraging and supporting the foreign production upon which they must now in part depend. *(Continued)*

viscose processing . . .
and Jackson & Church
pulp presses



medium size
J-C Zenith Press

J-C PULP PRESS

for constant press ratio
for superior filterability
for exceptional uniformity

RESULTS OF FULL-SCALE PRODUCTION TESTS IN PRESSING ALKALI-CELLULOSE DISCLOSED THESE IMPORTANT FACTS:

- *Maintains a constant press ratio.* Where a ratio of 2.75 to 1 is desired, the variation is less than ± 0.02.
- *Uniform xanthation* resulted in complete solution and marked improvement in filterability.
- *Exceptional product uniformity* has been proven by analyses of the cake delivered by the press in an annular ring.
- *Capacity up to 1000 pounds per hour,* based on dry weight of alpha pulp.

J-C engineers and facilities are available for consultation and assistance in developmental work. See what the production-tested J-C Zenith pulp presses can do.

High pressing efficiency of the J-C Pulp Press is obtained by an arrangement of ingeniously-constructed flights on a tapered, screw-type spindle. The slurry is prevented from rotating with the spindle by means of retarding resistors. Constant pressure on the slurry is maintained by the fully automatic "Floating Cone", *exclusive* with J-C Presses.

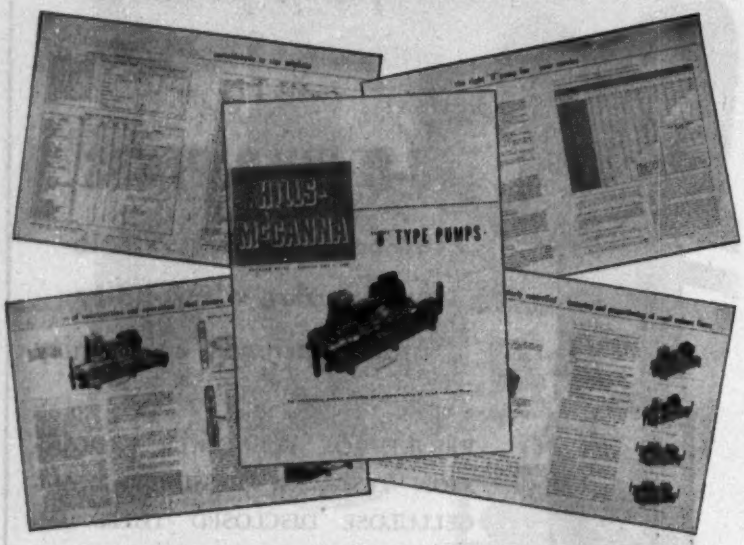
J-C Pulp Presses are also stepping up profits in such other fields as paper plants, canneries, corn starch plants, potato starch plants, rubber reclaiming plants and glue plants.

J-C

JACKSON & CHURCH CO. Saginaw, Michigan

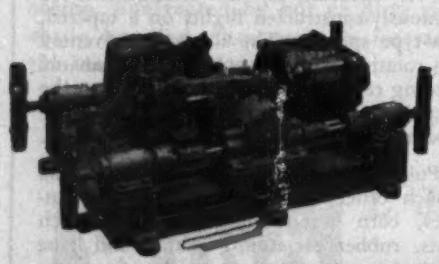
Work well done since '81

Here's a handy guide to the selection of metering and proportioning pumps



In this new catalog and pump selection manual for Hills-McCanna "U" Type Metering and Proportioning Pumps is all the information, including prices, for the selection of exactly the right pump for handling over 300 substances. Clearly and concisely, this helpful booklet gives all the necessary information and specific recommendations to cover the vast majority of needs that can be filled with a Hills-McCanna "U" Type Pump.

If your operations involve the metering or proportioning of small volume flows, you will find this catalog a useful addition to your files. We will be pleased to send you a copy on request. HILLS-McCANNA COMPANY, 2341 W. Nelson St., Chicago 18, Illinois.



Hills-McCanna "U" Type Pumps are reciprocating, variable stroke, mechanical drive units with maximum capacities ranging from 0.10 to 24 gph. per feed. One, two, three and four feed assemblies are available. Operating pressures up to 5,000 psi. A four feed unit is shown at the left.

HILLS-McCANNA

metering and proportioning pumps

Also Manufacturers of: Saunders Patent Diaphragm Valves Force Feed Lubricators • Magnesium Alloy Sand Castings

ECONOMICS, cont. . .

▶**Trouble Not Likely**—Putting the two arguments together, it's apparent that the U.S. could have troubles in lead by 1975. But as long as technology keeps up its present pace—a reasonable assumption—and future government action encourages both lead imports and the expansion of foreign mining properties, consumers can count on enough lead in the future to meet all essential needs.

An Investor Looks At Growth Companies

The term "growth company" is of particular interest to chemical men since it's perhaps more often applied to chemical and petroleum companies than to those in any other industry. And knowing the investment attitude toward a growth company is vital because it determines not only how much money you can get, but how much it will cost and what the terms will be.

Investors are obviously interested in growth companies. Such companies are excellent long term risks for several important reasons. First of all, although all company earnings suffer in depressions, the decline seems to be less severe and recovery much more rapid in growth companies. Even more important, since growth companies always plow so much of their earnings back into the business, the investor in effect delegates the risk-taking to company management. In other words, the management does a large part of his investing for him over the years.

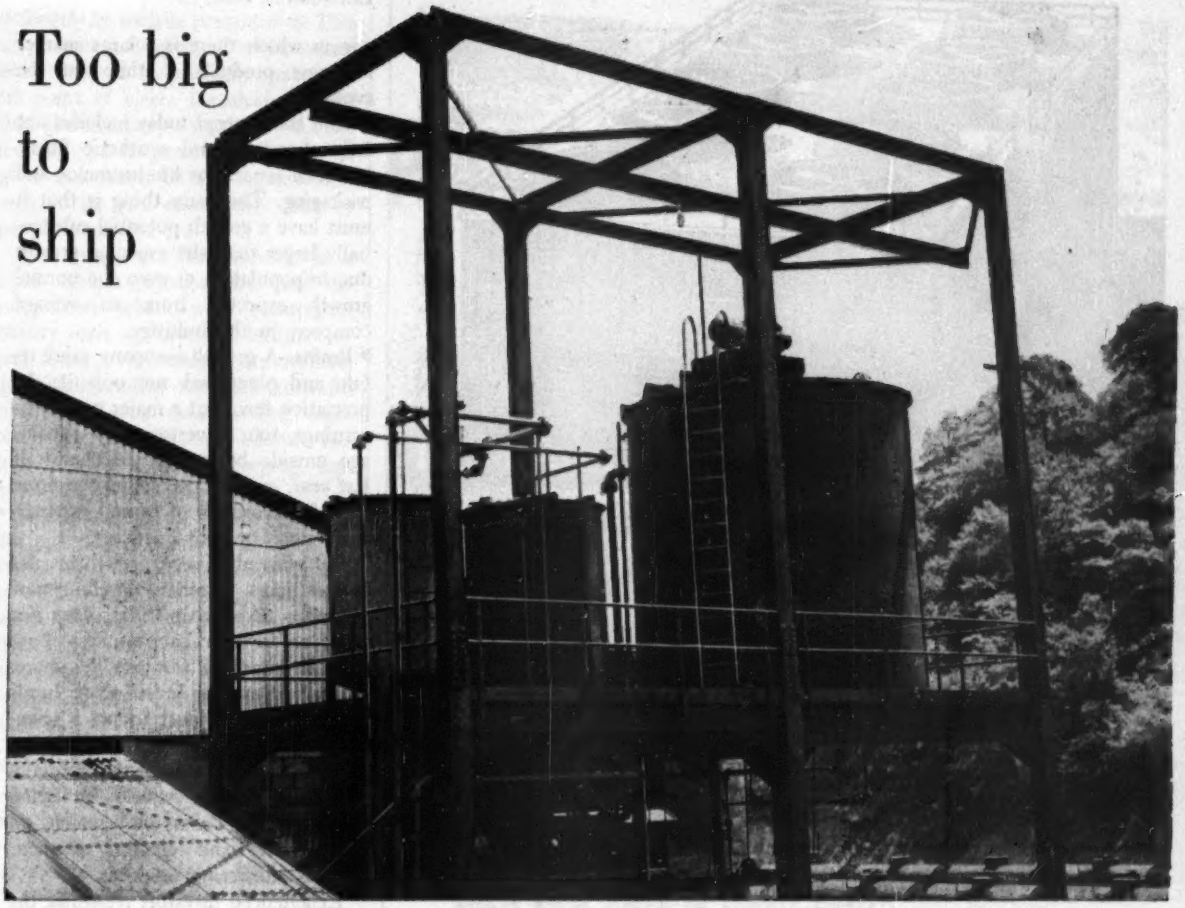
But how does an investor decide what constitutes a growth company? Here are the seven basic characteristics to look for.

▶**Well-Established**—It can't be just any company that's growing. A little oil company may have grown faster than Dow or DuPont over a given period, but it's still not acknowledged to have been a growth company at the start of the period. The concept doesn't include speculating on new inventions or small companies.

The first condition, then, is that it must already be a strong, well-established company.

▶**Growth Potential**—Growth can't come only from ordinary success at the expense of competitors. The company's field must be one whose existing products are expected to grow or

Too big to ship



so U.S. Permobond® protective linings were installed on the spot

EQUIPMENT requiring protection against corrosive attack can be lined with Permobond linings—*right in your own plant*. The above storage tanks in a chemical plant, for example, were too big to be shipped. So United States Rubber Company's Permobond Lining was installed and vulcanized right at the job site—insuring complete protection against the corrosive chemicals stored in the tanks.

This is one more example of the versatility and adaptability of the Permobond process. You can also have it installed *as original equipment* on anything that contains or conveys corrosive materials and chemicals—piping, tanks, valves. And where special conditions occur, a wide range of synthetic Permobond lining stocks is available. Write to the address below.

U.S. RUBBER
SERVING THROUGH SCIENCE

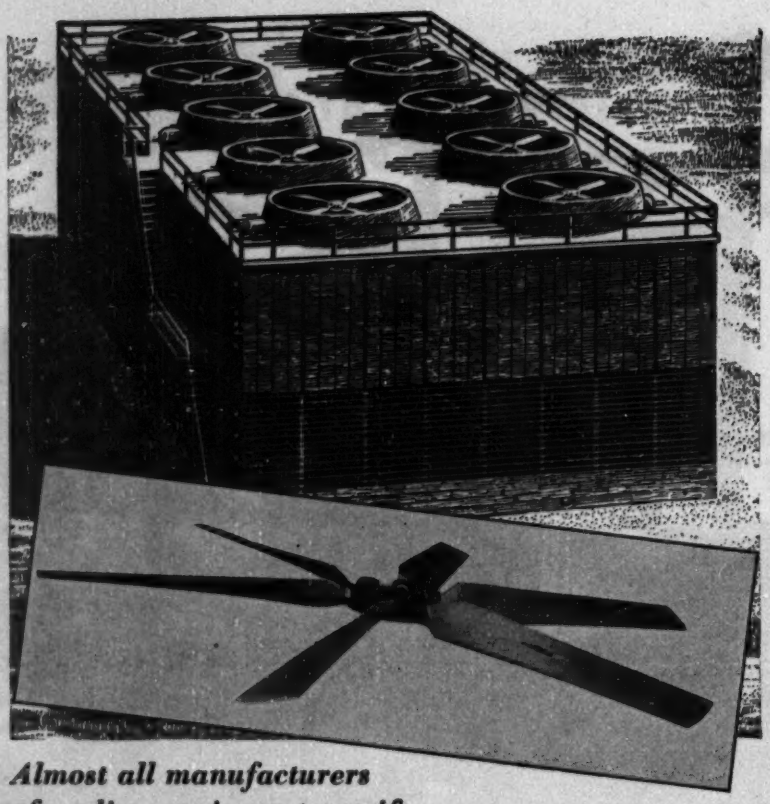
These hundreds of electrolytic mercury cells producing caustic soda and chlorine are lined with specially compounded Permobond hard rubber lining.

"U. S." Research perfects it..."U. S." Production builds it...U. S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Products • Molded and Extruded Goods • Protective Linings and Coatings • Grinding Wheels • Packings • Tapes • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting



Almost all manufacturers of cooling equipment specify

Aeromaster Fans for better service 2 ways!

Cooling towers, air coolers, cooling and condensing units—whatever your installation, Aeromaster Fans give you more cooling at lower cost! The reason is Aeromaster's unique two-way service.

1. Operating Service

In operation, Aeromaster Fans serve you efficiently because they are adapted from high-speed aircraft propellers, with adjustable blade pitch, and require less horsepower to operate. They serve you longer, thanks to improved anti-flutter performance and exclusive *Aeroloid* blade coating—protection from mild acids and alkalies, abrasion, and weather conditions. Aeromaster Fans are fully guaranteed . . . available in 5 to 24 ft. diameters, with 4, 6, or 8 blades per fan —capacities up to 1,000,000 cfm.

2. Maintenance Service

Famous Koppers engineering service is available for special installations, and large installations are Koppers-inspected to insure satisfactory performance. In addition, Aeromaster sales engineers are located in principal cities to assure prompt and efficient service. For original equipment or replacement, specify Aeromaster Fans for better service two ways!

KOPPERS

Aeromaster Fans

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE, MD. This Koppers Division also supplies industry with Fast's Couplings, American Hammered Industrial Piston and Sealing Rings, Koppers-Elex Electrostatic Precipitators and Gas Apparatus. Engineered Products Sold with Service

MAIL COUPON TODAY FOR COMPLETE INFORMATION

KOPPERS COMPANY, INC., *Aeromaster Fans* • 237 Scott St., Baltimore 3, Md.

Gentlemen: Please send me detailed information on Aeromaster Fans for

.....(name and type of equipment to be cooled)

Name.....

Title.....Company.....

City.....Zone.....State.....

one in which there is a large market for new products if they can be evolved.

And the concept today includes not only chemicals and synthetic fibers, but such services as life insurance and packaging. The main thing is that it must have a growth potential substantially larger than the expected growth due to population or even the normal growth expected from an average company in the industry.

▶**Profits**—A growth company must retain and plow back not only its depreciation flow, but a major part of its earnings, too. Investors even encourage outside borrowing. In chemicals last year, over 80 percent of the more than $600 million of capital expenditures came by debt financing.

But remember, mere growth in sales and earnings, whether by selling new securities or by acquistions, does not make an investor happy unless it results in increased earnings per share.

▶**Smart Planning**—Investing of funds by management must follow a scientific and intelligent plan. The company must create its own future deliberatively and aggressively by being willing to risk dollars on research, on investigating and creating markets, and on pioneering products.

Experienced investors recognize the risks and favor companies which have taken risks successfully in the past. The best growth companies seek sound, long-range production programs, not short-term profits.

▶**Expansion**—The modern concept of a growth company is that it changes constantly and grows like a living organism. The nature of change, of course, must be the result of many decisions—future markets, operating efficiency, cost of building and capital. At times expansion can be slow—at other times it must be rapid.

Growth can come either from within or by acquisition, but investors generally prefer growth from within. This preference rests on a feeling that such development is often accompanied by specialized "know-how" in research, manufacturing and selling. Acquisition, of course, often involves increasing the number of shares, with possible dilution of per share earnings. Also, intense exploitation of a field is usually preferred to horizontal growth in many directions.

▶**Social Awareness**—A growth company's activities and attitudes must

definitely be socially constructive. This may seem a surprising requirement, but it's based on a solidly materialistic point of view. Investors demand that the company's products be serviceable, that its personnel relations be good and that it be well regarded not only in its own community, but by people generally.

Too frequent labor trouble is a mark against management. And developments which were extravagant twenty years ago are solid business assets today. The campus atmosphere, quiet laboratories and the splendid equipment of a modern drug company, for example, are definite factors in attracting and keeping top-notch scientific talent.

▶ **Able Management**—This is obviously the most important requirement. Investors look for depth of management as well as ability at the top and resourcefulness is particularly prized. It's difficult to guide the destiny of any company, but to guide a growing company requires tremendous foresight and flexibility.

NOTE: *This analysis is based on a recent talk by William K. Beckers, partner, Spencer Trask & Co., New York, before the Comercial Chemical Development Association.*—EDITOR.

Aluminum Output Climbs to Three-Way All Time Record

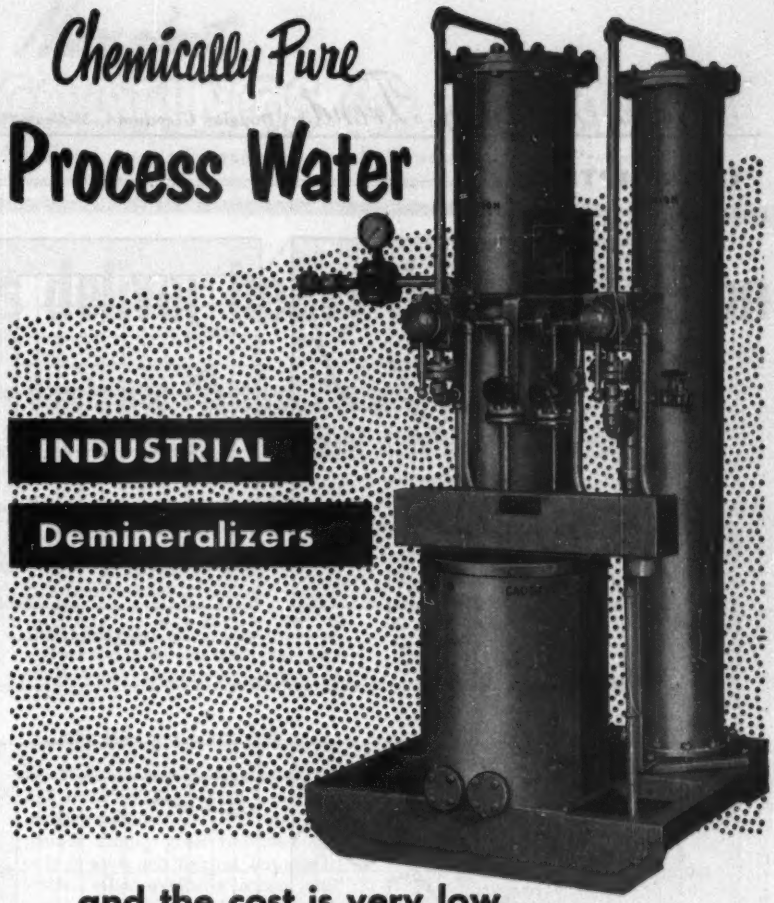
All-time daily, monthly and quarterly records were broken by U.S. aluminum producers in March with a primary aluminum output of 208,919,425 lb.

The quarterly production of 574,007,540 lb. was about 3 percent over the previous record of 558 million lb. set during the fourth quarter of 1943; monthly output was 11 percent above the October 1943 record, and the daily average high set in February (6.6 million lb.) was broken in March when the daily rate reached 6.7 million lb. March was also the peak production month of the quarter, outproducing February by more than 23 million lb.

And since the expansion program is still far from complete, new records can be expected in the coming months. How much more aluminum becomes available for civilian manufacturing, however, will depend on government stockpiling policy and military demands. —*End*

Chemically Pure

Process Water



INDUSTRIAL

Demineralizers

and the cost is very low...

With an INDUSTRIAL demineralizer chemically pure water, in any quantity, runs as low as a few cents per thousand gallons, depending upon the amount of dissolved solids in the raw supply water. And the equipment required is very simple — no heat, steam, or cooling water is used. Units can be made to deliver almost any quantity of purified water. The operation is practically automatic — only limited attention is needed periodically.

INDUSTRIAL demineralizers are supplied with necessary equipment including resins, pressure gauge, flowmeter, purity indicator, control valves, and with vulcanized rubber lining in columns and regenerant tanks.

Standard INDUSTRIAL demineralizer units have capacities up to 1000 gph. Special units of any capacity are engineered to special requirements of quality or quantity

Full particulars and recommendations for any job will be given upon request

INDUSTRIAL

FILTER & PUMP MFG. CO.

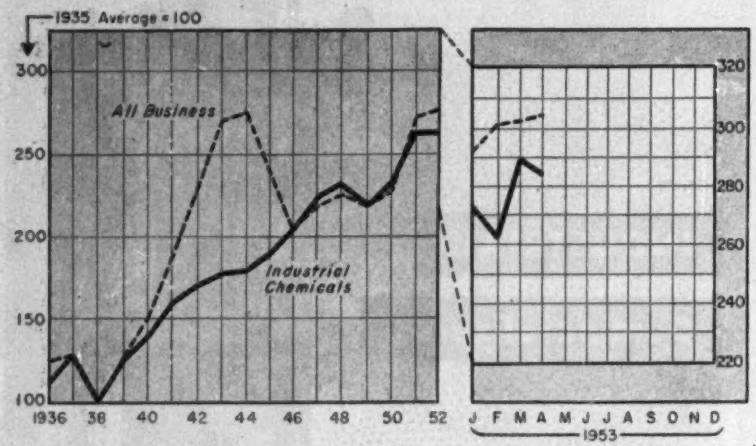
5918 Ogden Avenue, Chicago 50, Illinois

PRESSURE FILTERS
DEMINERALIZERS
RUBBER LININGS

Process Industry Trends

Douglas Greenwald, McGraw-Hill Dept. of Economics

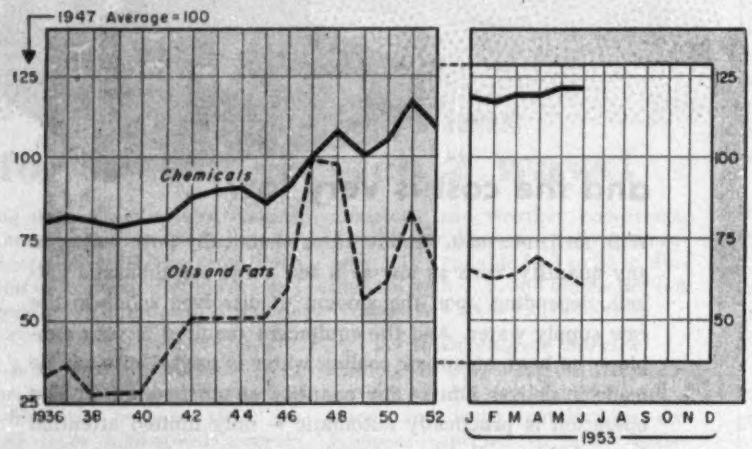
CONSUMPTION



Industrial Chemicals Index

	April (Est.)	March (Prelim.)	Feb. (Revised)
INDEX	285.09	289.27	267.49
Fertilizer		66.81	62.46
Pulp and paper	30.61	29.94	28.43
Petroleum Refining	26.55	28.23	25.52
Iron and steel	17.51	18.65	16.38
Rayon	31.48	29.61	25.17
Glass		24.44	21.17
Paint and varnish		29.12	25.53
Textiles		11.89	10.47
Coal Products		12.19	10.94
Leather		4.69	4.85
Explosives		8.49	8.22
Rubber	7.19	7.34	6.48
Plastics		17.87	17.87

PRICES

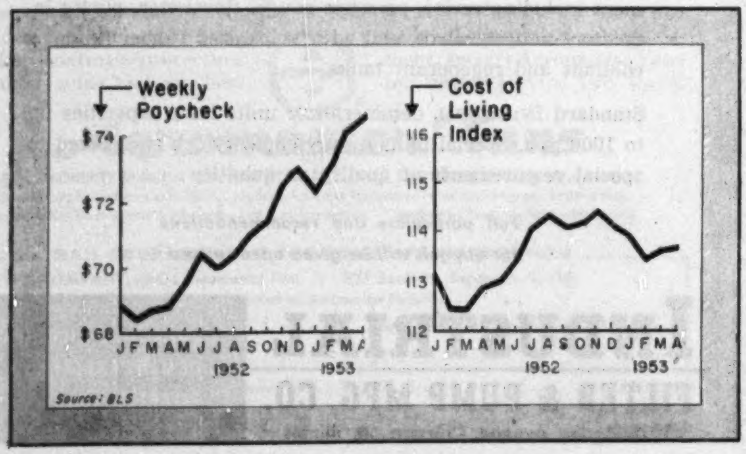


Chemical Engineering's Price Indexes

Chemicals	UP	+1.2%
Oils and Fats	DOWN	-5.4%

	Chemicals	Oils & Fats
As of June 1, 1953	121.89	61.33
Last Month	120.42	64.86
June, 1952	120.33	56.44
June, 1951	118.97	83.50

HIGHLIGHT OF THE MONTH



How Income Is Outdistancing Outgo

Weekly paychecks for chemical production workers are now higher than they ever were before. They averaged $74.50 in April 1953. This is better than 8 percent over what they were a year ago.

The cost of living, on the other hand, is less than 1 percent above what it was in April 1952. The index (based on 1947-49 = 100) now stands at 113.7. This is still slightly below the previous high of 114.3 which was reached twice: in August and November of last year.

UNICHROME
Trade Mark

News about
COATINGS for METALS
Metallic . . . . . Organic . . . . . Decorative . . . . . Protective

"Heavy" coatings deliver heavy duty protection

Plastisol usage for drum linings increasing

Drum manufacturers as well as drum reconditioners are beginning to make Unichrome plastisol-protection available to users of steel drums. And these users have begun to find the answers to better product packaging with less corrosion or contamination through these materials.

Also because of these heavy-duty linings, many newly developed products can be shipped in ordinary drums. In addition, they permit economical reuse of containers. Here's an interesting though accidental case to illustrate the point.

A producer of corrosive chemicals had several drums plastisol-lined for test. When research looked for the drums, they had disappeared. Later, they were found in the shipping department. They had been returned, inspected and re-shipped about 20 times. Regular lined drums had been good for only one to three trips.

Contact your supplier about lining *your* drums with Unichrome Series 4000 Drum Linings.

What a good "painting" program should do

The effectiveness of protective coatings used for corrosion control in processing plants can be measured by several obvious results of the program.

(1) Has it helped lengthen service life of equipment and reduced downtime?

(2) Has it increased interval between repainting?

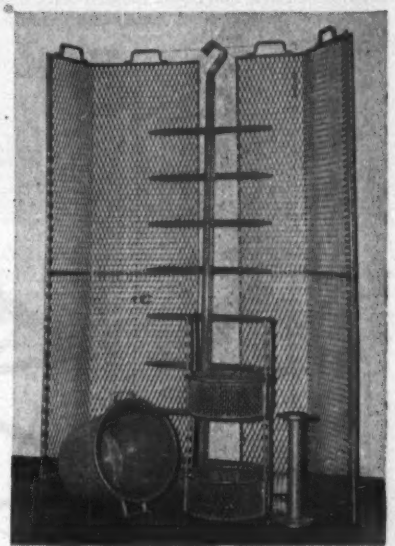
(3) Has it maintained a better looking plant?

Ucilon* Protective Coating Systems were developed as specialized answers to processing plant painting problems. Systems are available to withstand acids, alkalies, alcohols, organic chemicals, moisture, salts and exposure. That they make a painting program less costly and more effective can be seen from the many cases where they have given up to 5 years service under severe conditions. See more facts in your C.E.C.—or write for Bulletin No. MC-7.

**Trade Mark*

Unichrome Plastisol Compounds winning battles against strong chemical attack and corrosion

Plastisol compounds offer engineers a material with unusually valuable design and maintenance possibilities. They provide the three properties required for durable service in a wide variety of severe applications. They can profitably supplant rubber for some end uses, and protective maintenance coatings in others.



Tank screens, plating rack, drum, dipping basket and flanged pipe that obtained extraordinary chemical resistance with Unichrome Plastisols

WHY PLASTISOLS ARE UNIQUE

(1) They are highly chemical resistant. Produced from vinyl resins and plasticizers, Unichrome Plastisol Compounds display great resistance not only to acids and alkalies, but also to water, salts, oxidizing agents and many other corrosives.

(2) They are resilient. While Unichrome Plastisol formulations can be modified to produce a coating in any range from soft to hard, the greatest number of applications seem to be in the elastic, rubbery range. In this state, Unichrome Plastisols can outclass rubbers on toughness, chemical inertness and economy for many applications. And unlike ordinary protective coatings, Unichrome Plastisols absorb abuse and impact without chipping.

(3) Thick films can be produced. To guard against porosity in a coating and the possibility of accidental break-through, minimum film thicknesses are usually specified for protecting metals against strong corrosives. The thicker, the greater the protection. With ordinary coatings, this means applying many coats.

However, Unichrome Plastisol Compounds build up 3 mils to 1/16" thicknesses with a single prime and a single top coat. They "cure" to stable form at 350° in only 20 minutes.

TYPICAL RESULTS

Bleach reduction chambers of a noted chemical producer were coated with a Unichrome Plastisol Compound. This user reported that the coating gave 4 times longer service than even special alloy metals before requiring maintenance!

A processing plant replaced phenolic linings in equipment for spinning synthetic fibre with a Unichrome Plastisol Compound. By so doing, they ended build-up of hard sulfide deposits.

ENDLESS OTHER USES

When battling corrosive liquids and fumes, plastisol coatings are so thick and tough they can be depended on not to break or wear through. That's why they're used to coat drain boards, to line pipe and fittings, to protect ventilating fans, ducts, solution agitators, processing baskets and the like.

United Chromium's Technical Service department will be glad to give details on a specific plastisol to meet your problem. Write, giving details of the problem.

UNITED CHROMIUM, INCORPORATED
100 East 42nd St., New York 17, N. Y.
Detroit 20, Mich. • Waterbury 20, Conn.
Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada:
United Chromium Limited, Toronto, Ont.

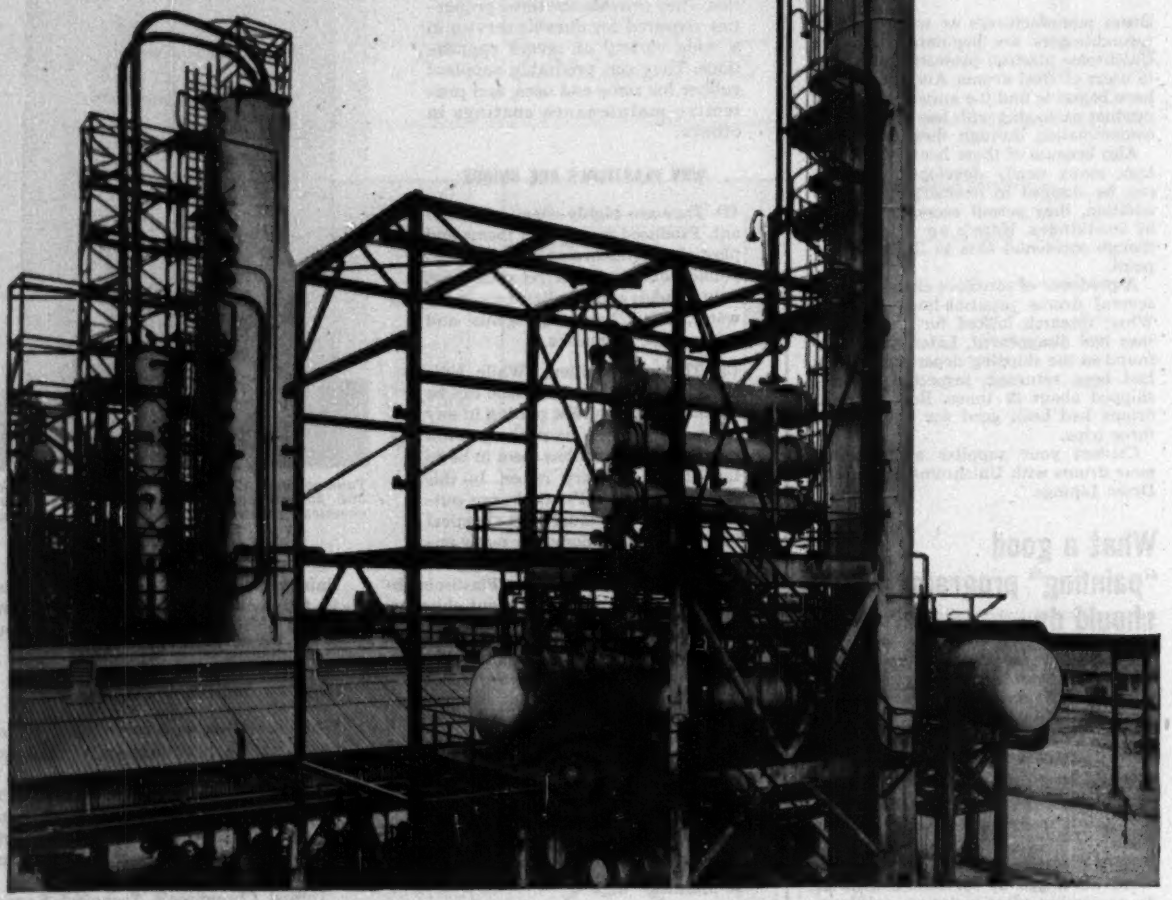
"ADVERTISEMENT"

demanded by growth and

Alco

Answers to

CUSTOM-BUILT HEAT EXCHANGERS at The Texas Company's Port Arthur Works are typical of the thousands of Alco heat-exchange units now in service at many of the world's largest petroleum, chemical and power installations. Special features are the Alco-patented impingement nozzles and clamp rings.



Hundreds of new industrial problems call for new and varied types of heavy metal equipment. More and more frequently, the answers are designed and built by Alco.

Alco's experience in the heavy equipment field is unsurpassed. You will find Alco products today in power, petroleum, chemical and manufacturing plants all over the world.

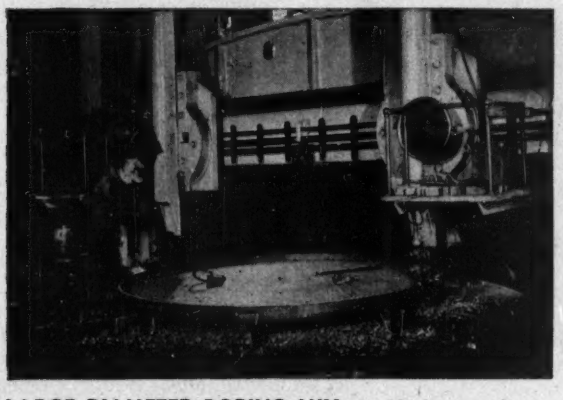
Alco's production and testing facilities are modern and complete. At the 81-acre Alco plant at Dunkirk, N. Y., the most difficult of metal-fabricating operations are handled with maximum speed and efficiency.

If your own industrial problems call for the kind of heavy metal equipment you see on these pages—the kind that can meet your strictest specifications—send the details to your nearest Alco Products Sales Engineer.

You will find him at New York, Chicago, Los Angeles, Kansas City, Houston, Tulsa or Beaumont. Or write direct to Dunkirk.

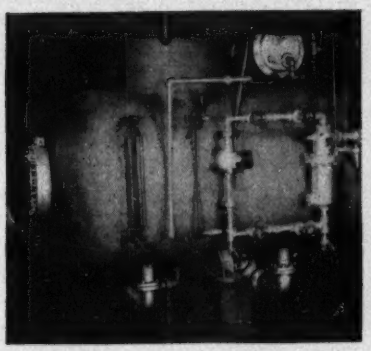
progress...designed and built by Alco

New Industrial Problems



LARGE DIAMETER BORING MILL at Alco's recently expanded Dunkirk plant is equipped with heads for both straight and bevel work. This is one of the many special machines that enable Alco to produce efficient, economical answers to hundreds of new industrial problems.

21 ALCO AIRCOOLERS handle all water cooling requirements at each of four pumping stations on the Trans-Arabian Pipe Line—with ambient temperatures as high as 122 F! Available in either radiator-core or fin-tube types, Alco Aircoolers offer a means to lower cooling costs for scores of applications.



FLEX-TUBE EVAPORATOR at New York State Electric and Gas Corporation's Hickling Station was designed and built by Alco to produce vapor under controlled conditions, of not more than 0.5 parts of total solids. Patented Flex-Tube construction greatly facilitates removal of scale.

25,000 FT OF ALCO STEEL PIPE help furnish the Arnold Engineering Development Center of the USAF with 100,000 gallons of cooling water per minute. Over the years, Alco has produced pipe of all shapes, sizes and materials for many of the largest industrial and municipal piping installations.

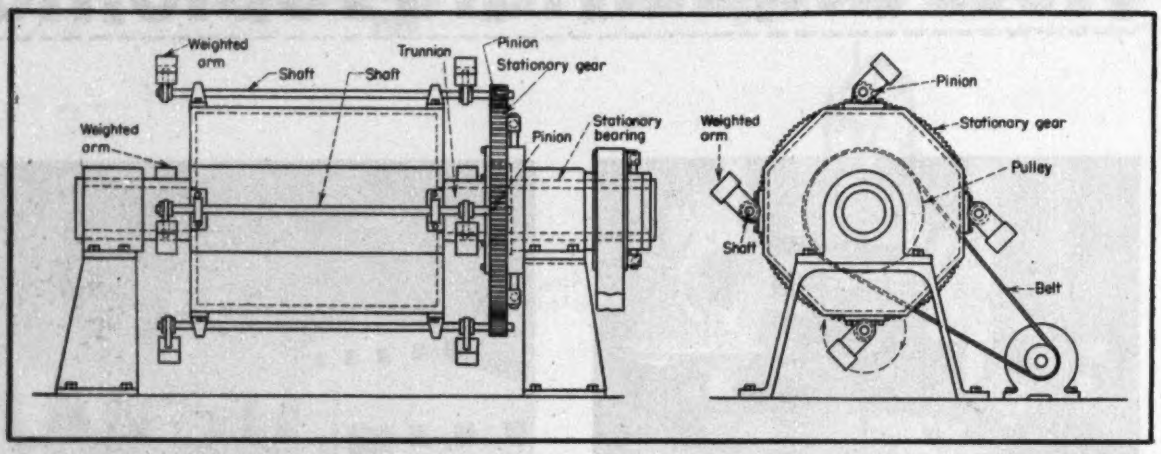
125-TON REGENERATORS for El Paso Natural Gas Company's new gas-turbine pumping installation are 10 ft in diameter, 33 ft long and contain over 5000 tubes. Units like these illustrate the wide range of special heavy-metal equipment designed and fabricated by Alco to meet virtually any specifications.

ALCO

ALCO PRODUCTS DIVISION

AMERICAN LOCOMOTIVE COMPANY • DUNKIRK, NEW YORK

EQUIPMENT PATENTS



New High-Speed Ball Mill

Here's an unusual idea in ball mill construction that lets you operate well above the so-called "critical speed" and at much higher grinding efficiencies.

In ball mill (or rod or tube mill) operation, it's essential that the speed of rotation be kept as high as possible, but not so high as to cause a centrifuging and packing effect. The faster the mill, the better the grinding, up to a point.

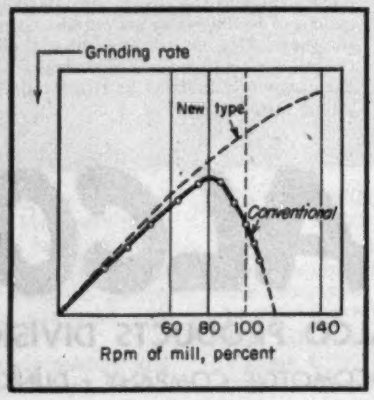
Both work input and grinding efficiency increase, at first, in proportion to the increase in speed. But as packing and centrifuging begin, work input increases more slowly until a "critical speed" is reached at which the charge clings centrifugally to the shell of the mill.

When this condition occurs, the charge merely whirls with the mill and grinding ceases. The combined tendencies of centrifuging and packing limit practical mill speeds to 60-80 percent of the critical speed.

Now Edward H. Cumpston has invented a mill which will operate at speeds of 100-140 percent of the critical speed. This is done by continually interrupting or momentarily reducing the mill speed. Cumpston claims that this reduces the centrifuging effect and also produces internal agitation of the charge, thereby raising the grinding efficiency.

The "interrupting" mechanism consists of a set of weighted arms mounted on shafts external to the drum (see cut above). These shafts are rotated by means of pinions and a large stationary gear mounted concentrically with an adjacent trunnion and supported from a stationary bearing.

As the system rotates, the shafts rotate at higher speeds than the drum and swing the weighted arms. This tends alternately to retard and accelerate the rotation of the drum which is driven by a pulley and belt. As an optional feature, the mill is shown as octagonal in shape instead of circular. This eliminates the necessity for internal lifting shelves or vanes within the drum.



As shown in the graph, a conventional mill (solid line) has a working range of 60-80 percent of the critical speed, while this new type (dotted line) has a working range of 100-140 percent of the critical speed. The invention, U. S. 2,633,303, has been assigned to Union Machine Co.

Slurry Contacting System Has Many Applications

Here's a continuous countercurrent tower for liquid-solid contacting. Claims are that it can be used to treat liquids with solid absorbents, or to wash and regenerate adsorbents, or for catalytic or chemical treating in refining operations.

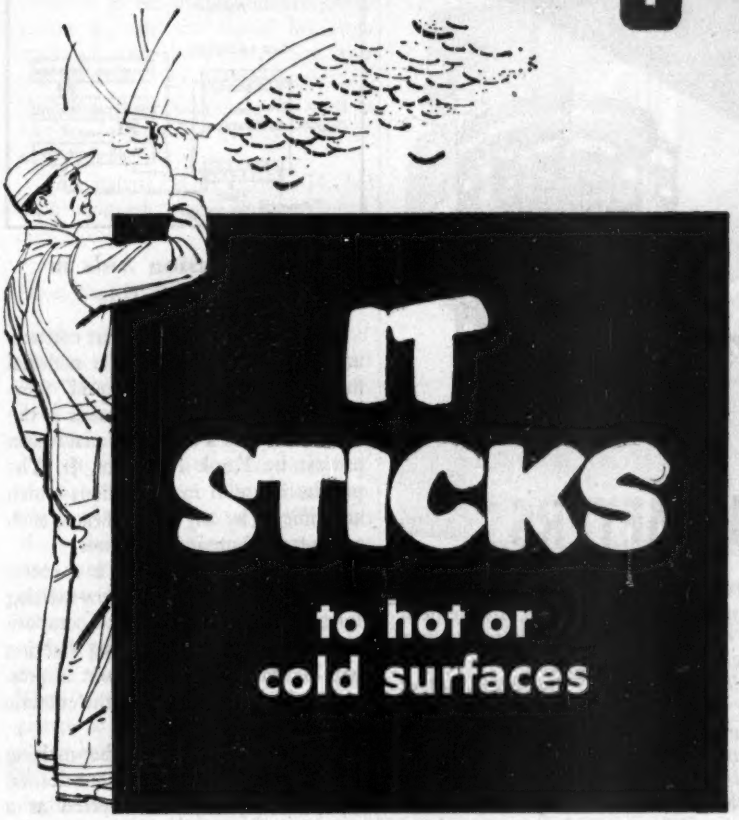
In essence, says inventor Stephen F. Perry, the apparatus operates on the principle that solids can be handled as a "slurry phase" in a manner similar to the handling of liquids. The slurry phase flows down the tower and is maintained by a liquid flowing upward at less than the free-settling rate of the solid—1 to 5 ft. per min.

Bubble caps or pierced plates and downcomers are employed in the tower. The fluid slurry is maintained on each plate, allowing overflow of slurry into the downcomers. Liquid velocity through the pierced plates is high enough to assure that flow through them is entirely upward.

EAGLE-PICHER

Super "66" Insulating Cement

Conforms to Commercial Standard CS-117



Because Eagle-Picher Super "66" Insulating Cement *really sticks*, it has money-saving advantages that are apparent the minute your crew begins to apply it.

Because *it sticks*—less time is wasted in application—it stays where you put it whether the equipment is heated or temporarily out of service. It "holds together" — usually no reinforcing needed on applications up to 1½ inches thick.

Because *it sticks*—Super "66" can be used effectively, economically on all types of surfaces—flat, curved, overhead—anywhere you need insulation. It's truly an all-purpose cement.

And—Super "66" is rust-inhibitive—cannot cause corrosion—actually helps prevent corrosion of costly equipment.

If you've never tried Eagle-Picher Super "66," it will pay you to learn more about it today!

"Springy Ball" structure—*the secret of the high thermal efficiency of Super "66." These small, resilient pellets of mineral wool, each one honeycombed with thousands of minute air cells, effectively resist the flow of heat even when used on equipment heated to 1800 F.*

Since 1843

EAGLE EP PICHER

THE EAGLE-PICHER COMPANY

General Offices: Cincinnati (1), Ohio

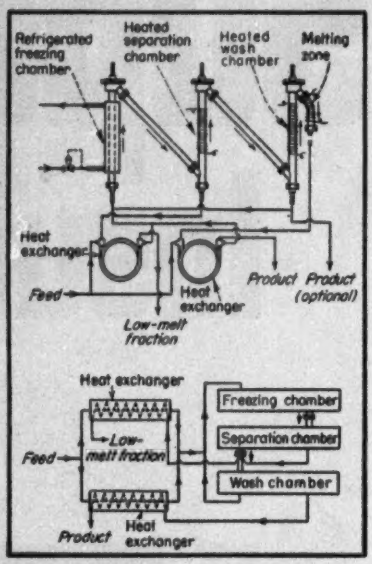
For greater efficiency, protection and economy, you should investigate these Eagle-Picher products: Insulating Felts • Insulating Block • Blankets • Loose Wool • Mineral Wool Pipe Covering • Stalastic Stamastic • Insulseal • Finishing Cements • Insulating Cements • Swetchek • Insul-Stic • Fireproofing Cement

Member of Industrial Mineral Fibre Institute

Although WESTON provides sensing elements of various forms for special applications, the element in all standard WESTON Industrial Thermometers is a *multiple helix* as illustrated above. Why the more costly *multiple*, instead of the single, helix? *Just one reason.* WESTON's twenty years experience producing bi-metal thermometers for industry has furnished convincing proof that the shorter, non-sagging *multiple* helix provides better accuracy, over longer periods. And while it provides other advantages, the one thing most thermometer buyers demand is long-term dependability. You get it, in extra measure, in WESTON Thermometers with *multiple* helix. WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

WESTON *Thermometers*

The patent, U. S. 2,632,720, assigned to Standard Oil Development Co., also discloses some modifications of tower design which are helpful in the slurry contacting process.



Fractional Fusion Aids in Purification of Solids

Continuous countercurrent contacting between a solid granular material moving up and a "reflux liquid" flowing down the separation vessels is the main feature of a new fractional-fusion process by Frank P. Vance, Jr. The process is useful in separations which are difficult by any other means, such as cis-trans butene-2 mixtures.

Assuming that the feed is a eutectic-forming mixture, the low-melting fraction will have the eutectic composition and the higher-melting fraction will be whichever component is present in the feed in excess of the eutectic composition.

In other words, the higher-melting fraction is the pure component desired and the impurity is recovered as a eutectic mixture by melting or dissolving in the reflux liquid. This liquid is of higher purity, with respect to the high-melting component, than the solid feed.

Liquid feed is split into two streams, each of which goes to a heat exchanger (see cut). The cooled feed streams then join and successively pass through a refrigerated freezing chamber, a heated separation chamber and a heated wash vessel.

Frozen feed enters the bottom of

the separation chamber and is partially melted as it travels upward. The liquid reflux formed in this manner moves down the chamber and is collected at the bottom. The low-melting fraction then passes through a heat exchanger, cooling part of the feed.

Solid reaching the top of the separation chamber is conveyed to the bottom of the heated wash vessel. Any liquid formed is collected at the bottom and can be removed as product if its purity is satisfactory, or it can be recycled to the bottom of the freezing chamber.

Solid reaching the top of the wash chamber passes into a melting zone, cools part of the feed in a heat exchanger and finally is removed as product. The purpose of the wash chamber is to provide further purification in case the liquid has been occluded with the solids stream passing overhead from the separation chamber. Screw conveyors are used to transfer solid in and between the various vessels.

This patent, U. S. 2,632,314, has been assigned to the Phillips Petroleum Co.

New Bubble Cap Assembly

An ingenious method of overcoming the effects of hydraulic gradient on a bubble cap is described in U. S. 2,627,397, by Hurshel V. Hendrix, assigned to Phillips Petroleum Co. The vapor risers are equal in height, but the bubble caps automatically position themselves at varying heights above the chimney, so that constant slot submergence is maintained regardless of variations in the liquid rate.

The bubble caps are made of lightweight material, and are not anchored. They are free to float upward in groups of about six as required by the liquid level at the particular point on the tray. Small flanges are provided on the top of some or all of the vapor risers in each group to prevent the bubble caps from floating away.

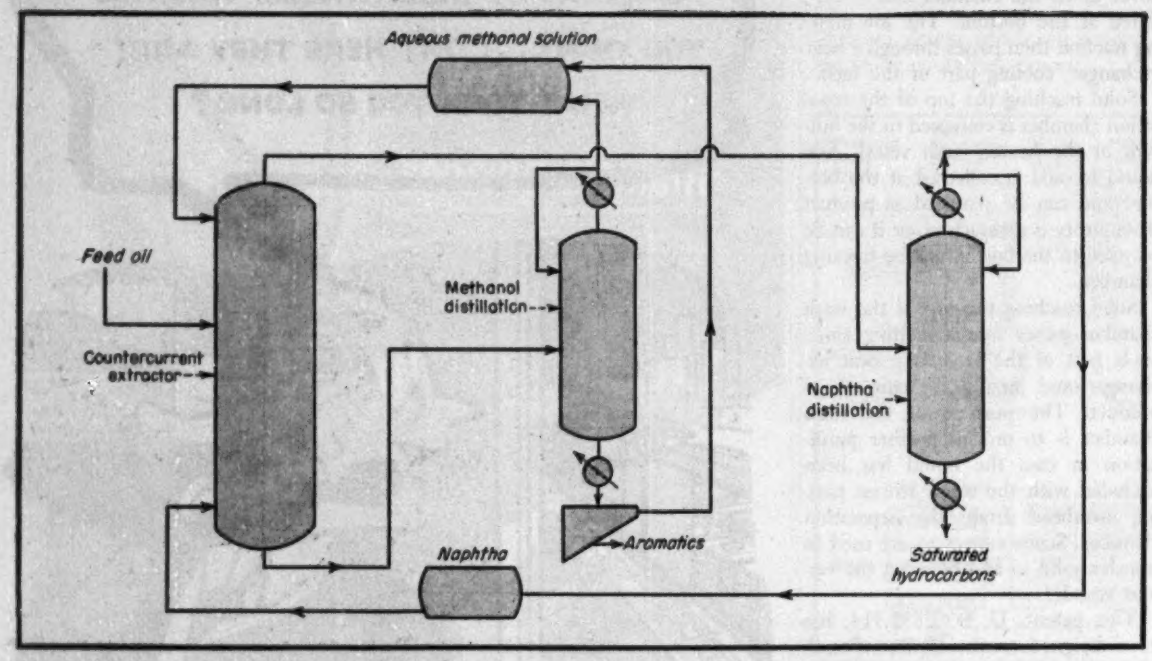
This digest of recently issued patents is selected and evaluated for you by Melvin Nord, 664 Putnam, Detroit 2, Mich. You can get copies of any patents, including those mentioned here, by ordering from the Commissioner of Patents, Washington 25, D. C. They cost 25¢ each. Do not send stamps.

Don't pin us down to that, please. But, no fooling, the twelve Bemis multiwall plants, strategically located coast to coast, mean that at least one is conveniently close to you. This time-saving means money-saving. Ask your Bemis Man for details.

Bemis

BAG COMPANY

General Offices — St. Louis 2, Mo.
Offices in all Principal Cities



Double Solvent Extraction Yields Aromatics

New naphtha-methanol solvent extraction process will separate aromatics and saturated hydrocarbons from a variety of coal oil and petroleum fractions.

Low-boiling naphtha and an aqueous methanol solution can be used to separate aromatics and saturated hydrocarbons from mixtures free of tar acids. So claims Martin B. Neuworth in U. S. 2,633,448, assigned to Pittsburg Consolidation Coal Co.

The process is particularly applicable to the neutral oil fraction of the tar produced by low-temperature carbonization of coal. Neuworth also claims that it can be used for coal hydrogenation oils, shale oil fractions, oils produced by synthesis processes, and petroleum fractions.

▶**How It Works**–Aqueous methanol is fed into the top of a vertical, double-solvent, countercurrent extraction column (see cut). A low-boiling naphtha solution enters the bottom of the tower and flows countercurrent to the methanol. Feed is charged at an intermediate point.

Aromatics and certain unsaturated compounds in the feed are stripped by the methanol and removed at the bottom of the column. The saturated hydrocarbons (paraffins and/or naphthenes) dissolve in the low-boiling naphtha solution and are removed at the top of the tower. Each fraction is then subjected to distillation in order to recover the final products and the solvents are recycled to the extraction column.

The naphtha solvent should be low in specific gravity–preferably below 0.75–in order to insure rapid phase separation in the extraction column. It must also be low-boiling–60 to 100 deg. C.–in order to separate it from the recovered saturated hydrocarbons by distillation.

The aqueous methanol must contain from 75 to 96 percent methanol by weight and is preferably over 86 percent methanol for the production of pure aromatics. Concentrations above 96 percent are unsatisfactory because appreciable quantities of naphtha becomes soluble in the aqueous methanol.

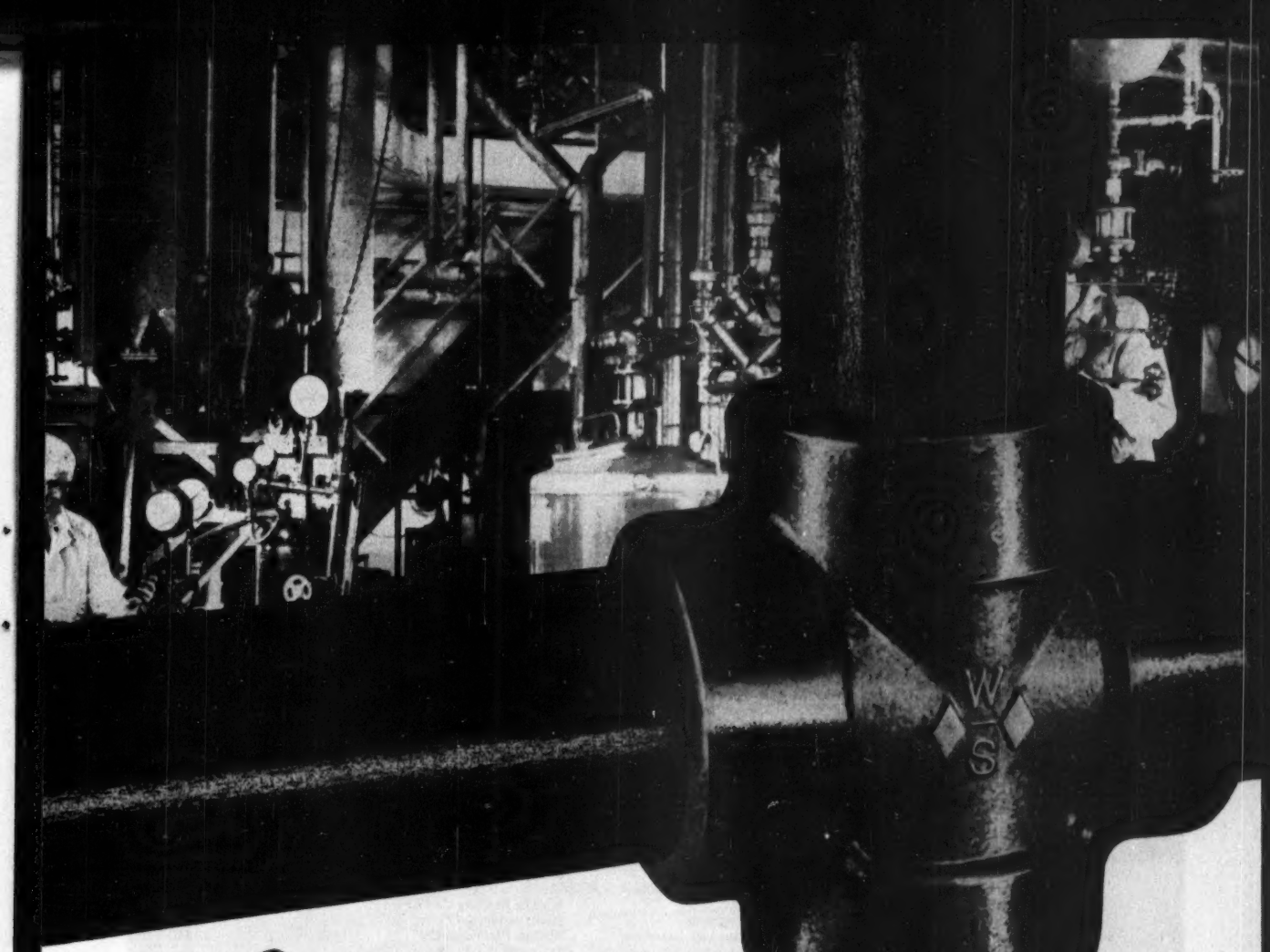
▶**Optimum Volumes**–Best naphtha volume to use in the extraction column is 2 to 5 times that of the feed, while that for the aqueous methanol solution is 1.5 to 20 times as much as the feed, depending on the composition of the oil and on the naphtha-to-oil ratio. In general, when little naphtha is used, less methanol is needed.

If possible, it's better to operate with the naphtha phase as the continuous one. Accordingly, the aqueous methanol phase is dispersed and falls as tiny globules down through the naphtha. The column interface is maintained in the bottom section of the tower, below the point of naphtha feed. Temperature is not critical, but the preferred range is 60-120 deg. C.

Use a Rotating Annulus For Vapor-Phase Reactions

Walter F. Rollman has assigned to Standard Oil Development Co. a means for carrying out catalytic, vapor-phase chemical reactions in a rotating annulus. A hollow cylinder, coated on the outside with a catalyst and rotated mechanically about a central horizontal axis in a fixed cylinder or housing does the trick.

Means are provided for introducing



They Give...

PERMANENT PIPE-LINE SECURITY

From *Master* Craftsmen come the world's finest *FITTINGS* . . . drop forged from solid billets of specially blended *STEELS.*

Your pipe connections can be harmonious and lasting . . . even endure beyond the normal life of the system . . . if proper consideration is given the compatibility of their meeting. Many millions of feet of pipe and tubing have been brought together by W-S Double-Diamond Forged Steel Fittings in lasting unions against time . . . heat . . . pressure . . . turbulence . . . corrosion . . . oxidation . . . vibration . . . reduction and shock.

Such fortunate meetings withstand the adverse conditions of *ANY* service environments because W-S FITTINGS are inherently superior to those made by methods other than PRECISION MACHINING from solid FORGED stock.

Whatever your pipe or tubing application, you can profit from the permanence of W-S Double-Diamond (Screw-End and Socket-Weld) Forged Steel Fittings.

SOLD THROUGH LEADING DISTRIBUTORS

WATSON-STILLMAN FITTINGS DIVISION

H. K. PORTER COMPANY, INC.

130 ALDENE RD., ROSELLE, NEW JERSEY

reactant vapors through the outer fixed cylinder into the annular space between cylinders and the vapors are made to follow a definite course by means of baffles. A heat exchange medium can be supplied at the inside wall of the rotating cylinder.

Rollman claims that his technique provides satisfactory control of reactions where short contact times are necessary and a very limited catalyst area is sufficient. As an example, the patent, U. S. 2,633,477, gives details on the partial oxidation of certain hydrocarbons, such as in the catalytic production of phthalic anhydride from naphthalene.

Conversion of Oils To Monoglycerides

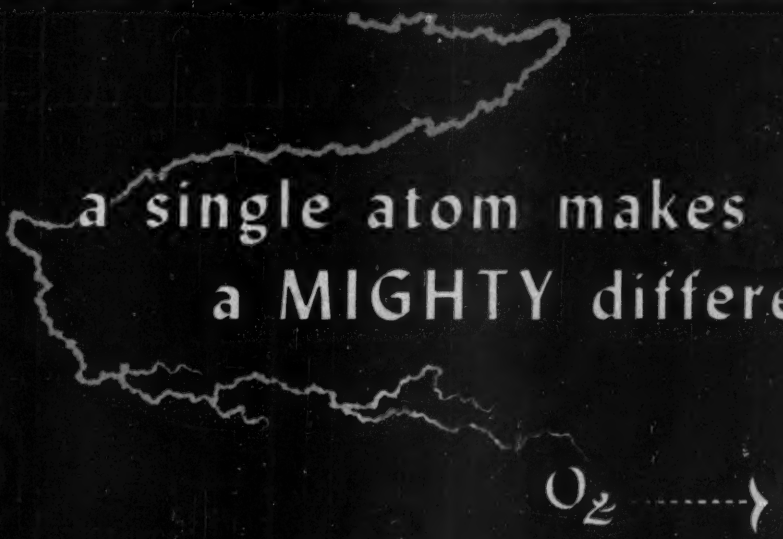
Two recent patents by Noel H. Kuhrt describe a new method for converting oils, such as soy bean oil, to their monoglycerides. It's done by reacting the oil with glycerine in the presence of an ester-interchange catalyst. Suitable catalysts include many alkali and alkaline earth metal oxides and hydroxides. Bivalent metal compounds such as strontium oxide are usually preferred.

The oil-glycerine-catalyst mixture is reacted to cause alcoholysis of the fatty material and formation of substantial amounts of the monoglyceride. The patents, U. S. 2,634,278 and 2,634,279, also show how to separate the reaction products by repeated centrifugal vacuum distillation to avoid reversion. Both patents have been assigned to Eastman Kodak Co.

Your Checklist of New Process Patents

Product . . .	Process . . .	Inventor or Assignee . . .	Patent No.
Carbon Black	Production of carbon black	Phillips Petroleum Co	2,632,713
Catalysts	Preparation of siliceous catalyst beads containing free magnesia	Houdry Process Corp	2,631,983
	Regeneration of hydrocarbon synthesis catalyst by treatment with ethanol	Standard Oil Development Co	2,632,015
	Catalyst for aromatising paraffin hydrocarbons	Standard Oil Development Co	2,632,739
	Making a barium-chromium-copper-alumina type	Celanese Corp. of America	2,634,242
Fats and Oils	Separating ester-interchange catalyst from fats	Eastman Kodak Co	2,634,234
Fuels	Manufacture of oil gas and water gas	Robert T. Collier	2,634,107
Gases	Separation of CO_2 from gas mixtures containing H_2 and hydrocarbons	The Texas Co	2,632,316
	Continuous adsorption process with reduced heat requirements for separating gas mixtures	Standard Oil Development Co	2,633,207
Hydrocarbons	Solvent extraction of lube oils with liquid CO_2	Socony-Vacuum Oil Co., Inc	2,631,966
	Catalytic conversion in pebble heaters	Phillips Petroleum Co	2,631,907
	Rejection of inactive material from a fluidized catalyst regenerator	Sinclair Refining Co	2,631,981
	Oxidation of aromatic hydrocarbons	Hercules Powder Co	2,632,026
	Iso-octanes from cyclopropane and isobutane	Phillips Petroleum Co	2,632,030-1
	Production of acetylene from liquid hydrocarbons	Technical Assets, Inc	2,632,731
	Adsorption separation of naphthenes from paraffin hydrocarbons	Standard Oil Development Co	2,632,778
	Fluid-type retorting of oil shale	Standard Oil Development Co	2,634,233
Inorganic Chemicals	Production of noncolloidal calcium carbonate	Ecusta Paper Corp	2,631,922
	Purification of magnesia	The Philip Carey Manufacturing Co	2,631,923
	Making hydrolysable titanium sulfate solutions	E. I. du Pont de Nemours & Co	2,631,924
	Preparation of calcium cyanamide	Monsanto Chemical Co	2,632,687
	Production of chromium trioxide	Diamond Alkalai Co	2,632,688
	Cooling of molten sulfur	Freeport Sulphur Co	2,632,691
	Generation of sodium peroxide	National Distillers Corp	2,633,406
	Removal of iron from caustic soda solutions	The Dow Chemical Co	2,634,192
Metals and Ores	Froth flotation of iron-bearing minerals from feldspathic ores	Tenn. Valley Authority	2,633,241
Organic Chemicals	Preparation of 2-chloro, 4-nitrophenol	Allied Chemical & Dye Corp	2,629,745
	Production of penta-erythritol	Hercules Powder Co	2,629,746
	Production of 9-chloro- or 9-bromo-decalin	Phillips Petroleum Co	2,629,748
	Production of ethylene by catalytic pyrolysis	The Dow Chemical Co	2,629,753
	Formation of CS_2 from carbon and sulfur	The Babcock & Wilcox Co	2,630,373
	Isolation of flavanone glucosides	Texsun Citrus Exchange	2,630,432
	Preparation of organic hydroperoxides	Shell Development Co	2,630,456
	Chloromethylation of alkyl benzenes	Rohm & Haas Co	2,630,459
	Production of acetylene	Hans Sachsse, Thomas Koebahn and Erwin Lehrer	2,630,461
	Stabilization of chlorinated paraffin wax	Diamond Alkalai Co	2,631,125
	Oxidation of unsaturates in acid solution	Universal Oil Products Co	2,631,160
	Production of dimethyl hydrogen phosphate	Universal Oil Products Co	2,631,161
	Separation of reaction products from propylene and aqueous ammonium polysulfide	E. I. du Pont de Nemours & Co	2,631,166
	Reduction of halo-nitro compounds	General Aniline & Film Corp	2,631,167
	Preparation of substituted hydroxy benzyl alcohol	General Aniline & Film Corp	2,631,169
	Preparation of fluorocarbons	United States of America	2,631,170
	Manufacture of hexachloro-cyclo-pentadiene	Jack S. Newcomer	2,631,171
	Preparation of aryl halo-alkanes	Universal Oil Products Co	2,631,172
	Production of cyclo-octadiene	Phillips Petroleum Co	2,631,173
	Production of polycyclic benzene hydrocarbons	Universal Oil Products Co	2,631,174
	Production of liquid polybutadiene	Phillips Petroleum Co	2,631,175
	Recovery of vitamin B_{12}	Chas. Pfizer & Co., Inc	2,631,964
	Purifying alcohols having oxidisable impurities	Stanolind Oil & Gas Co	2,631,970
	Treating of tars to produce optically clear tar and activated carbon	Allied Chemical & Dye Corp	2,631,982
	Production of organo-silicon compounds	Union Carbide & Carbon Corp	2,632,013
	Production of phenol from benzene by oxidation in presence of liquid HF	Phillips Petroleum Co	2,632,027
	Production of phenols by fusion reactions	Monsanto Chemical Co	2,632,028
	Synthesis of urea	Phillips Petroleum Co	2,632,771
	Oxidation of liquid cumene and p-cymene with O_2	Hercules Powder Co	2,632,774
	Production of monobromo-nitromethane	The Dow Chemical Co	2,632,776

a single atom makes a MIGHTY difference!



nly a single atom of oxygen marks the difference between ordinary oxygen and *extraordinary* ozone but what a difference!

n Welsbach Ozone, industry has found a new tool a powerful oxidizing agent which exceeds all ordinary chemicals except fluorine in its oxidation potential. And in addition to its potency as an oxidant, Welsbach Ozone offers additional unique advantages advantages which make it far superior to ordinary chemical oxidants. Welsbach Ozone adds only oxygen no post oxidative clean-up is necessary. Provides instantaneous reaction at ordinary temperatures and pressures. It is generated at the point of use, with no full time supervision or labor necessary. Operating costs are constant and predictable and maintenance costs negligible. And there is no storage expense and no materials handling.

elsbach Ozone may be the right answer to what you want in an oxidant. Test its value and versatility in your process—in your own laboratory—with the Welsbach Model T-23 Laboratory Ozonator. You can discover for yourself how Welsbach Ozone can lower costs and increase profits for you!

IF YOU ARE FACED WITH AN OXIDATION PROBLEM

OZONE

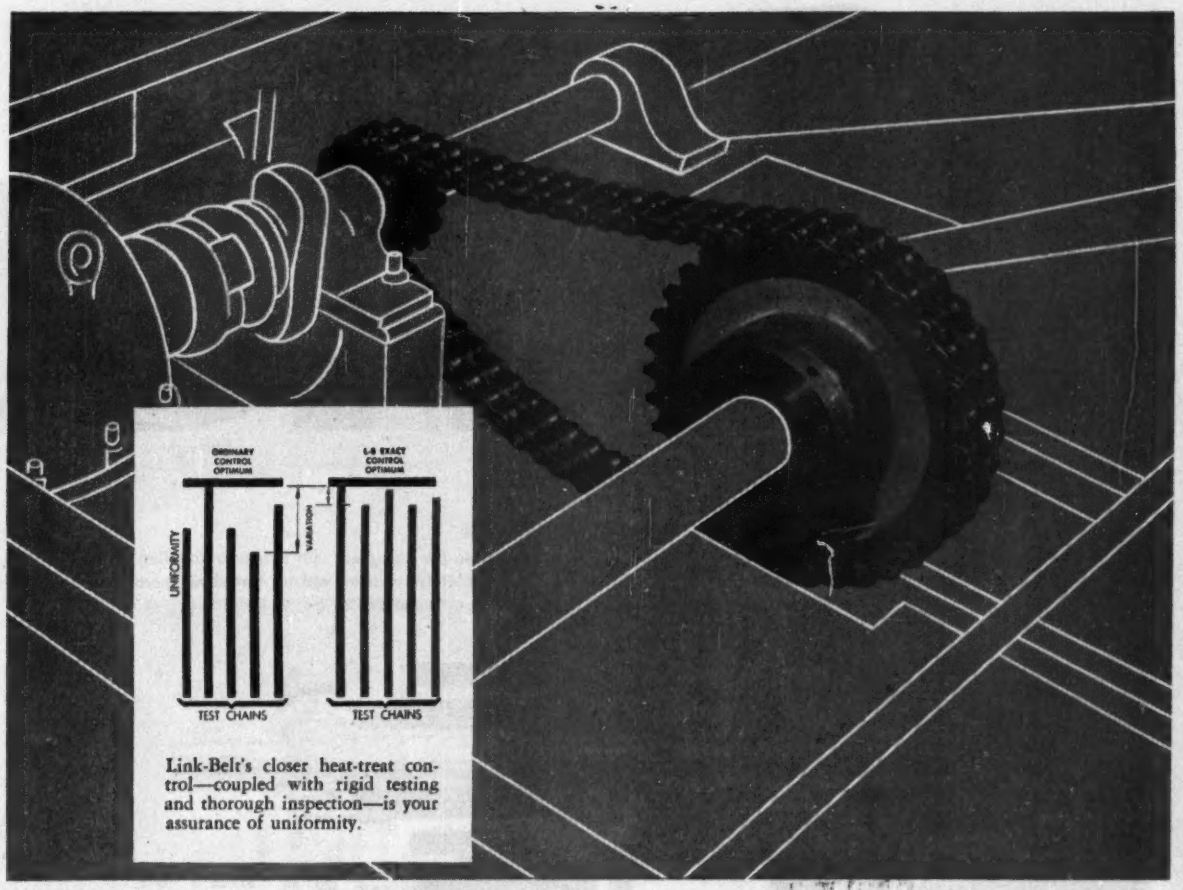
THE WELSBACH CORPORATION

Engineers in Controlled Ozone Fabrication

Product . . .	Process . . .	Inventor or Assignee . . .	Patent No. . .
	Catalytic isomerization of m-xylene to p-xylene	Standard Oil Development Co	2,632,779
	Production of CS_2 from carbon and SO_2	The New Jersey Zinc Co	2,633,409
	Production of aromatic hydroxy acids	Parke, Davis & Co	2,633,470
	Catalytic dehydrogenation of secondary alcohols to ketones	Standard Oil Development Co	2,633,475
	Production of aromatic hydroperoxides	Shell Development Co	2,633,476
	Sulfation of aliphatic alcohols	Monsanto Chemical Co	2,634,287
	Catalytic dehydrogenation of aldohols to carbonyls	Celanese Corp. of America	2,634,295
	Preparation of beta mono-ethers of glycerols	Shell Development Co	2,634,296
	Separation of isomeric erythritols by fractional crystallization	Phillips Petroleum Co	2,634,298
	Production of vinyl fluoride	Phillips Petroleum Co	2,634,300
Pigments	Production of red, nonhydrated iron oxide	Mineral Pigments Corp	2,633,407
	Manufacture of iron oxide pigments	Minnesota Mining & Manufacturing Co	2,634,193
Plastics	Making chemically-blown sponge rubber & plastics	United States Rubber Co	2,634,243
	Manufacture of cellular plastics having foam-stabilising additives	Lockheed Aircraft Corp	2,634,244
Pulp and Paper	Manufacture of active carbon from black liquor	West Virginia Pulp & Paper Co	2,632,738
Resins	Manufacture of acenaphthylene resins	C. D. Patents, Ltd	2,632,749
	Low-temperature polymerisation of vinyl hydroxyalkyl ethers to polyacetals	Rohm & Haas Co	2,633,460
	Preparation of water-dispersable alkyd resins	Pittsburg Plate Glass Co	2,634,245
	Manufacture of resin for wet strength paper	Allied Chemical & Dye Corp	2,634,246–7
Rubber	Preparation of hypohalogenated rubber derivatives	The B. F. Goodrich Co	2,633,478
	Preparation of synthetic butadiene-styrene rubber	Houdry Process Corp	2,634,257
Synthesis Gas and Products	Manufacture of synthesis gas	Standard Oil Development Co	2,631,933
	Manufacture of a gas rich in CO	Standard Oil Development Co	2,631,934
	Hydrocarbon synthesis	Gulf Research & Development Co	2,632,016
	Catalytic synthesis of hydrocarbons	The Texas Co	2,632,017
	Production of CO and H_2 from hydrocarbons	The Texas Co	2,632,600
	Separation of oxygenated organic compounds from synthesis mixtures	The M. W. Kellogg Co	2,632,765
	Coal carbonization and gasification	Hydrocarbon Research, Inc	2,634,198
	Production of synthesis gas from coal	United States of America	2,634,286

. . . And New Equipment Patents

Operation . . .	About . . .	Inventor or Assignee . . .	Patent No. .
Adsorption	Separating liquids by continuous adsorption	Gulf Research & Development Co	2,631,727
Chemical Reaction	Synthesis gas generator and waste heat boiler	Combustion Engineering-Superheater, Inc	2,631,932
	Multiple bed catalytic apparatus	Hydrocarbon Research, Inc	2,632,692
	Initial sealing of cyclone dip-legs	Tide Water Associated Oil Co	2,634,191
Crushing and Grinding	Jaw crusher	Nelson H. Bogie	2,631,785
	Vibration conveyor with opposed-plate crusher	Ferro Corp	2,634,060
	Gyratory crusher	Smith Engineering Works	2,634,061
Crystallization	Sugar crystallizer	E. W. Kopke	2,633,435
Distillation	Double-column type rectifying column	Joy Manufacturing Co	2,633,717
Evaporation	Crystal separation by multiple-effect evaporation	Blaw-Knox Co	2,631,926
	Evaporation of heat-sensitive liquids by direct contact with combustion gases	Swift & Co	2,632,505
Filtration	Rotary filter press	Baker Perkins, Inc	2,631,527
	Fiber disk-filter assembly	Wm. W. Nugent & Co., Inc	2,631,732
	Clarifying solid suspensions from liquids by upward flow through a filter bed	S. F. Pellas and Max Kraut	2,633,243
	Clarifying vacuum filtrate	Biggar & Associates, Inc	2,633,993
Fluid and Particle Transfer	Slide valve for controlling suspended solids flow	Sinclair Refining Co	2,631,759
	Pumping volatile liquids	Air Products, Inc	2,632,302
Gas-solids Separation	Electrostatic precipitator	Westinghouse Electric Corp	2,632,522
	Wet gas scrubber	The Fluor Corp., Ltd	2,632,523
	Multitubular centrifugal separator	The Thermix Corp	2,632,527
	Automatic actuator for shaking dust collector bags	The Northern Blower Co	2,633,206
	Centrifugal air separator for removal and classification of particles	William R. Carter	2,633,930
Heat Transfer	Stabilized alumina pebbles	Phillips Petroleum Co	2,631,353
	Punched fin elements for heat exchangers	The Air Preheater Corp	2,632,633
	Mullite-bonded zircon pebbles	Phillips Petroleum Co	2,633,623
	Manufacture of perforated plates for tube sheets	Standard-Thomson Corp	2,633,630
	Heat exchanger cleaning device	Robert W. Drake	2,634,164
Instrumentation	Apparatus for measuring viscosity at remote points	Sun Oil Co	2,633,016
	Liquid-level indicator for pressure vessels where solids tend to deposit	United States of America	2,633,021
	Liquid-level measuring in large vessels	Republic Flow Meter Co	2,633,022
	Relative humidity indicator of wet-dry bulb type	Weston Electrical Instrument Corp	2,633,024
	Mercury-type pressure gage	Valentine Bautista	2,633,026
	Portable gas analyzer	J. J. Ferraniolo	2,633,411
	Indication and control of acidity or alkalinity of non-aqueous systems by colorimetric means	Petrolite Corp	2,633,472
	Thermal conductivity-type gas analyzer for plural mixtures	Cambridge Instrument Co., Inc	2,633,737
	Measuring heat transfer rates in an exchanger	Telefonaktiebolaget LM Ericsson	2,633,747–9
Liquid-solid Separation	Centrifugal separation of liquids	Aktiebolaget	2,633,294
	Variable-level skimmer	Process Engineers, Inc	2,633,969
Liquid-liquid Separation	Collecting-electrode construction for electrical precipitators	Western Precipitation Corp	2,631,684
	Construction of water-flushed electrode for electrical precipitators	Western Precipitation Corp	2,631,685
	Collecting electrode	Research Corp	2,631,686
	Rotary plate electrical precipitator	Francis J. Dohrer	2,631,687
Mixing	Immersion-type agitator	G. J. Okulitch and I. V. Zosulin	2,633,339
	Emulsifier for intimate mixing of liquid and gas	Societe d'Epuration et d'Enterprises	2,633,344
	Homogenizer for liquid mixtures	Aktiebolaget Separator	2,634,109
Solid-solid Separation	Hydraulic classifier	George A. Auer	2,631,726
	Viscosity control in heavy media separation	American Cyanamid	2,633,967



Link-Belt's closer heat-treat control—coupled with rigid testing and thorough inspection—is your assurance of uniformity.

Closer heat treat control means longer roller chain life!

But it's only one of many engineering extras you get from LINK-BELT

THE long-life record of Link-Belt Precision Steel Roller Chain is based on more than closer heat treat control. Consider such extra-wear features as shot-peened rollers and lock-type bushings. They're further assurance of Link-Belt's *built-in* extra life.

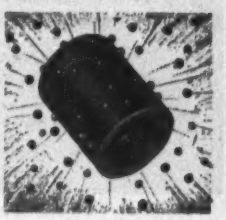
Link-Belt Roller Chain is available in single or multiple widths, ⅜" through 3" pitch. Double pitch, 1" through 3". For all the facts, call the Link-Belt office or distributor near you today, or write for Data Book No. 2457.

LINK-BELT

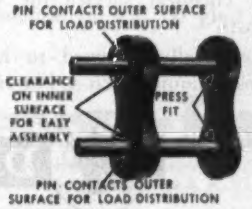
ROLLER CHAIN & SPROCKETS

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,120-A

Don't overlook these other LINK-BELT extras



Shot-peened rollers have extra fatigue life for higher speeds, heavier loads.


PIN CONTACTS OUTER SURFACE FOR LOAD DISTRIBUTION
CLEARANCE ON INNER SURFACE FOR EASY ASSEMBLY
PRESS FIT
PIN CONTACTS OUTER SURFACE FOR LOAD DISTRIBUTION

Couple, uncouple multiple-width chains easily.

Lock-type bushings assure free articulation.

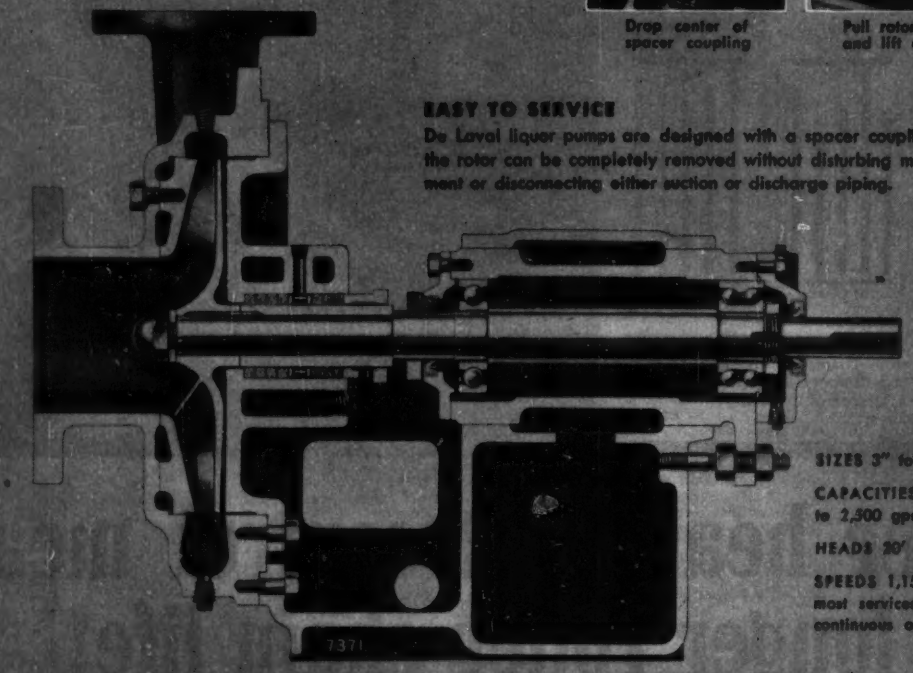
DE LAVAL
LIQUOR PUMPS

for tough chemical service

Drop center of spacer coupling

Pull rotor back and lift out

EASY TO SERVICE
De Laval liquor pumps are designed with a spacer coupling so that the rotor can be completely removed without disturbing motor alignment or disconnecting either suction or discharge piping.



SIZES 3" to 6"

CAPACITIES 100 gpm to 2,500 gpm

HEADS 20' to 150'

SPEEDS 1,150 rpm for most services requiring continuous operation

- One piece suction nozzle with single joint minimizes leakage.
- Eductor vanes on back of impeller relieve stuffing box pressure.
- Rotor can be adjusted with external adjusting screw to compensate for wear.
- Oil mist lubrication minimizes bearing friction.
- Extra deep stuffing box has inlet and outlet water seal connections and inlet and outlet stuffing box cooling connections.
- Suction liner is easily and inexpensively renewed.
- Heavy stiff shaft withstands severe operating conditions.

The important design features, shown above, explain why De Laval type CL Liquor Pumps (1) take the punishment of tough chemical service for years; (2) cut maintenance costs.

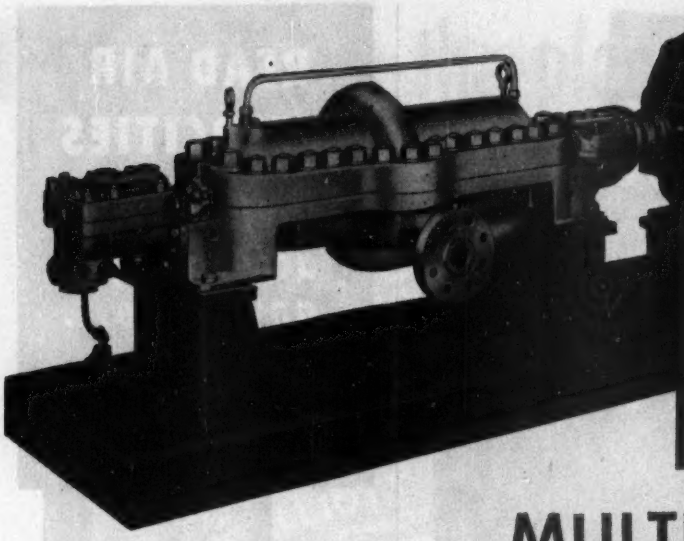
These pumps are especially designed to handle "tough" *corrosive* or *erosive* liquids such as hot or cold acids, alkalies, digester liquors, milk of lime, etc. What's more, De Laval Liquor Pumps are easy to get at for servicing, thus substantially reduce downtime.

See your De Laval representative for full application and specification data on these De Laval pumps, or write giving details on your specific service.

DE LAVAL *Liquor Pumps*

DE LAVAL STEAM TURBINE COMPANY
803 Nottingham Way, Trenton 2, New Jersey

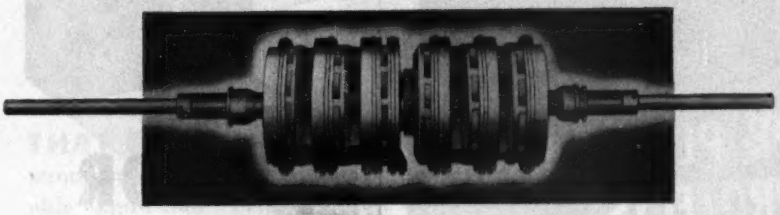
DL 199



Ingersoll-Rand

CNTA

MULTI-STAGE PUMPS



extend the advantages of the

UNIT-TYPE ROTOR ASSEMBLY

HIGHER SUSTAINED EFFICIENCY

Greater simplicity of design, with precision-matched impellers and channel rings, permits unusually high efficiency which is sustained throughout years of operation.

GREATER DEPENDABILITY

Radial balance with multiple-volute design and axial balance with opposed impeller grouping, assure long trouble-free operation. The smooth-bore, symmetrical outer casing eliminates any possibility of distortion under high temperature operation.

REDUCED MAINTENANCE

Entire rotor assembly can be removed from the casing as a single, compact unit, without disturbing piping connections. There are no ring fits to align on replacement of the rotor assembly.

to your medium pressure applications

• With the completely re-designed line of CNTA multi-stage pumps, Ingersoll-Rand offers a new high in performance, efficiency, dependability and economy—for medium-pressure boiler feed, mine dewatering, marine, petro-chemical and general hydraulic services.

The advanced design Unit-Type rotor assembly, with impellers and channel rings mounted on a single, heavy-duty shaft and with a smooth-bore outer casing, is the same type as that used by Ingersoll-Rand in the high-pressure CHTA and HMTA lines. The result of this modern construction is a dependable, simpler and more rugged unit that requires minimum attention and maintenance.

CNTA pumps are multi-stage, horizontally split units, with single-suction impeller groups placed back-to-back to eliminate hydraulic thrust. They are available in 4, 6 and 8 stages for pressures from 100 to 800 psi, in capacities from 50 to 700 gpm.

Your I-R representative will be glad to give you the *complete story*.

Ingersoll-Rand

Cameron Pump Division
11 Broadway, New York 4, N. Y.

844-10

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

SAFETY FEATURE ADDED TO

Ohio's Type 1000

RETURN BEND

BAR-TYPE PLUG PULLER PROTECTS the MAINTENANCE MAN

- One-man operation
- No loose pieces
- Holds plug in place after seal is broken
- Cannot damage return-bend seat or plug
- Full leverage on closest centers
- Pullers available for all sizes (separate puller required for each size)

THE OHIO STEEL FOUNDRY CO.

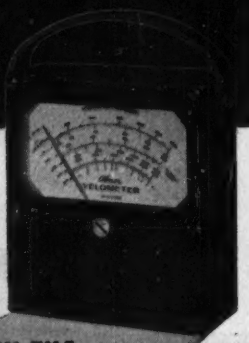
LIMA, OHIO—Plants at Lima and Springfield, Ohio

District offices in:

Chicago, Cincinnati, Cleveland, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, Tulsa

READ AIR VELOCITIES

instantly... accurately... anywhere...



...WITH THE

ALNOR VELOMETER

Alnor Velometer, a precision-built, self-contained, portable instrument, gives you instant, *accurate* readings of air velocities anywhere—in plants, mines, mills or laboratories. Measures speed of air flow through ducts, grilles, furnaces, spray booths or in the open. This rugged instrument needs no special care or delicate handling—anyone can use it and get accurate readings. Need no calculations or reference charts. Available in a wide variety of scale ranges, and with a full assortment of jets and fittings for every application. You'll want full details and prices, so write for Bulletin 2448-G, Illinois Testing Laboratories, Inc., Room 559, 420 No. La Salle St., Chicago 10, Ill.

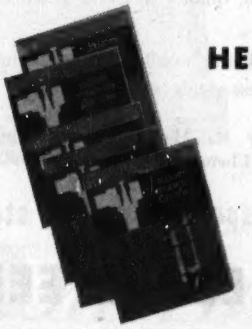
Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Nothing takes the place of experience

THAT SERIAL NUMBER is the strongest possible certification of the valuable "know-how" back of Elliott steam jet ejectors and their application. Over thirty thousand is a formidable number of installations, easily covering many times over every possible process for which vacuum is used, and every possible set of conditions under which steam jet ejectors can be adapted to operate most profitably.

All the experience and data behind these multitudinous ejector set-ups is available to assure the success of your installation, whether it requires the use of a simple single stage ejector, or a huge multi-stage unit with intercondensers to supply absolute pressures as low as .003 in. mercury. The cooperation of Elliott engineers is yours for the asking.



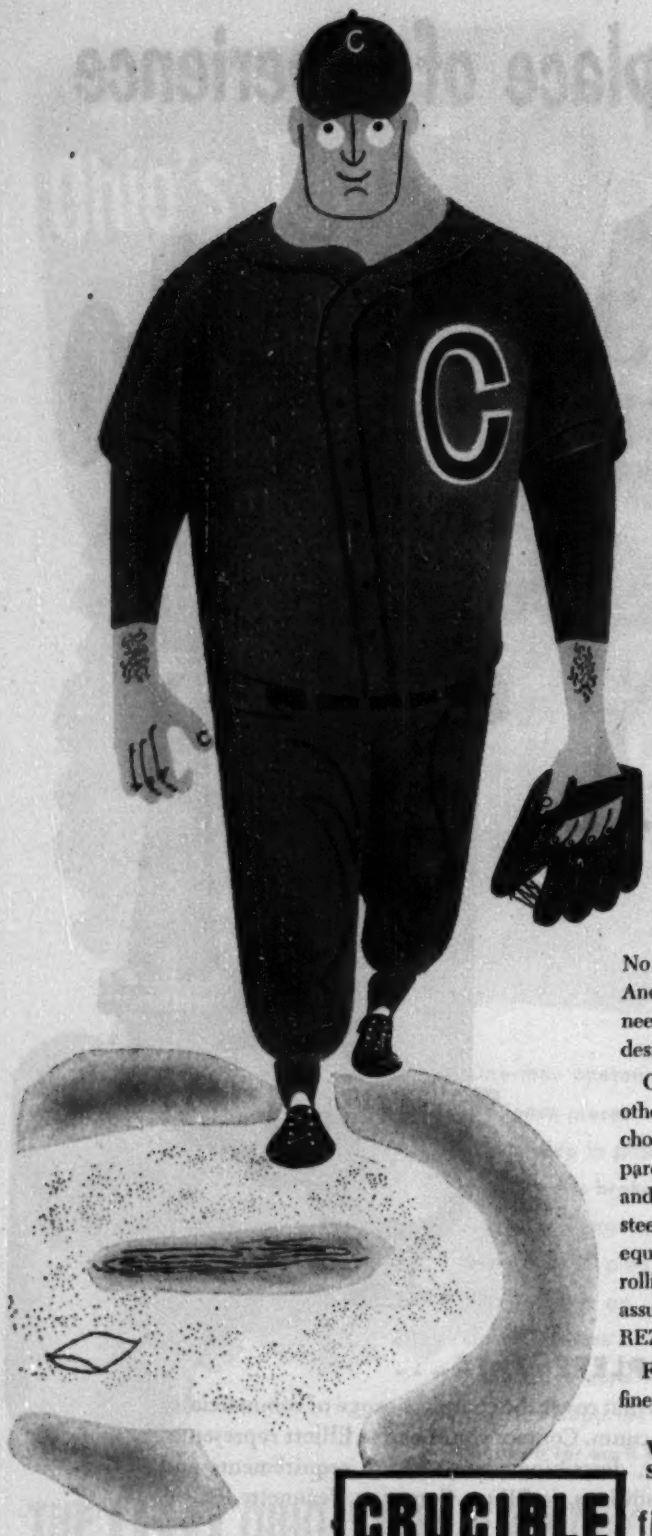
HERE IS COMPLETE DATA . . .

Five bulletins that cover the complete range of commercially obtainable vacuum. Contact your nearest Elliott representative, or write, describing your vacuum requirements and operating conditions, to Elliott Company, Jeannette, Pa.

ELLIOTT Company

INDUSTRIAL PROCESS DIVISION

G3-3



choose the stainless that does the best job

No one stainless steel meets every set of service conditions. And you should not pay extra for special properties you don't need. You can economize too, by selecting alloys especially designed for your fabricating processes.

Crucible produces around thirty standard alloys and many other special types of REZISTAL stainless steel. To help you choose the proper grade, our field representatives are prepared to bring you the latest and most complete metallurgical and fabrication data available on the application of stainless steel. And our plate, sheet, strip, bar, wire and tube mills are equipped with the most completely automatic controls for rolling, annealing, heat treating, finishing and polishing to assure you of unvarying quality in every piece of Crucible REZISTAL.

For assistance in solving application problems and the finest quality in stainless steels, call Crucible.

Write for free copy of "Making the most of Stainless Steels in the Chemical Process Industries".

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

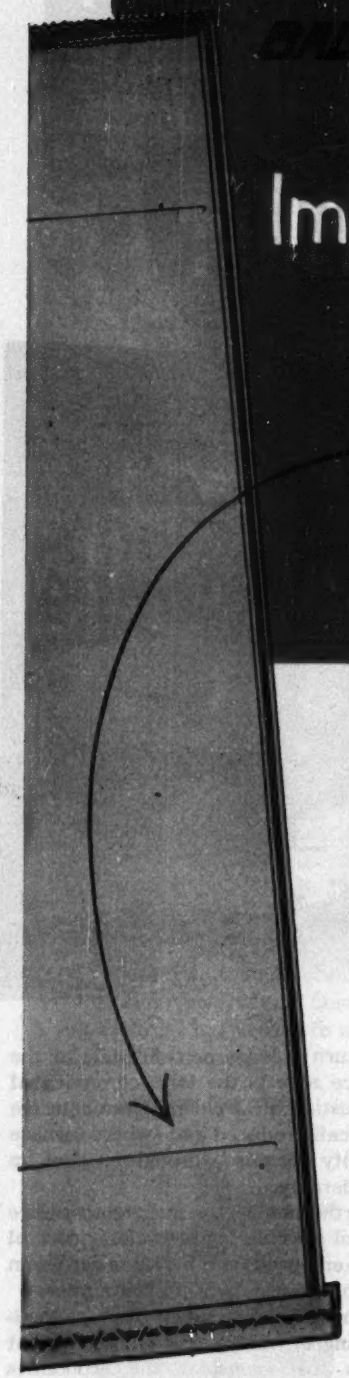
STAINLESS STEEL

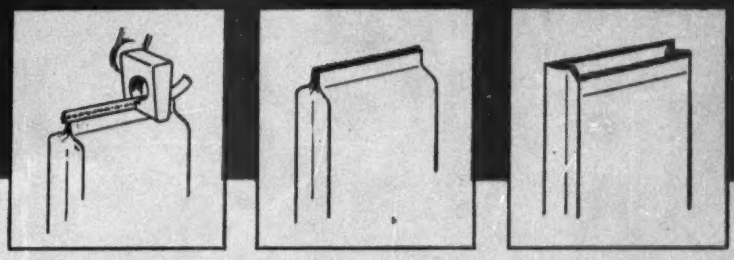
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

STAINLESS • REX HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

BAGPAK PREFORM*

Improves the Open Mouth Multiwall Again!





The more easily closed PREFORM bagtop first introduced in this country by Bagpak—and now tremendously successful—has been further improved with the PREFORM feature at the bottom—at no additional cost.

This new PREFORM Multiwall permits filling to the very bottom—makes it easier to form the top—speeds bag closing—reduces sewing time. PREFORM feature at the bottom with its increased efficiency often permits the use of shorter bags.

- Makes bagtop forming easier
- Speeds bag closing
- Permits better filling
- Makes better looking package!

SEND COUPON TODAY for full information!

INTERNATIONAL PAPER COMPANY — Dept. E-11.
BAGPAK DIVISION
220 East 42nd Street, New York 17, N. Y.
Gentlemen:
Please send me full information about the new Bagpak PREFORM Multiwall Paper Bags.

NAME_____

ADDRESS_____

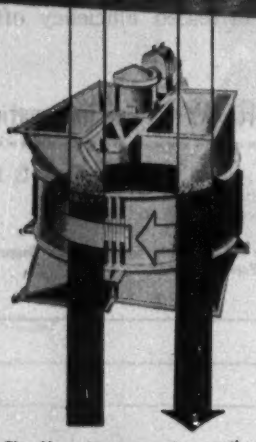
*Trade Mark

International Paper COMPANY
BAGPAK DIVISION

BRANCH OFFICES: Atlanta • Baltimore • Baxter Springs, Kansas • Boston Chicago • Cleveland • Denver • Detroit • Kansas City, Kansas • Los Angeles New Orleans • Philadelphia • Pittsburgh • St. Louis • San Francisco • IN CANADA: The Continental Paper Products, Ltd., Montreal, Ottawa, Toronto

Get Higher Throughput

Ljungstrom Air Preheater



The Ljungstrom operates on the continuous regenerative counter-flow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves, the heat is transferred from the waste gases to the incoming cold air.

With the process industries' production at all-time high levels — and climbing higher — here is a timely suggestion that may point the way to significant production increases in your plant — *without adding a single still.*

A Ljungstrom Air Preheater, properly combined with modern draft and burner equipment, can increase still production as much as 25%. At the same time, plugging is so much reduced that production lost to downtime will be astonishingly low.

The value of the Ljungstrom Air Preheater lies in its ability to recover heat normally lost up the stack, and to return a large portion of it to the furnace zone in the form of preheated combustion air. Fuel requirements are drastically reduced and—where furnace capacity permits — throughput goes up considerably.

Furthermore — the finer temperature control possible leads to closer control of the end product. This alone can mean tens of thousands of dollars a year.

Wherever you are replacing, modernizing, or adding new equipment that burns fuel — consider the economies you can get with a Ljungstrom. Call or write The Air Preheater Corporation for complete information.

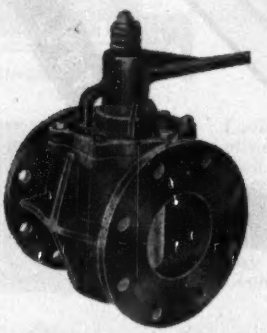
Wherever You Burn Fuel, You Need Ljungstrom

THE AIR PREHEATER CORPORATION 60 East 42nd Street, New York 17, N. Y.

FRICTION FREE
DeZURIK VALVES

DeZurik Easy-Operating Plug Valves offer 100% friction-free service on any line. In opening the valve, the slightest movement of the lever lifts the rubber plug-face entirely free of the eccentric valve seat; completing the quarter-turn swings the plug out of the way—smoothly, easily, WITHOUT FRICTION! The plug-face does not come into contact with ANY PART of the valve body except at the moment of closure. No friction means no binding or scoring; there's no lubrication needed, and virtually no maintenance. Get the complete story on DeZurik Easy-Operating Plug Valves in all sizes and metals.

Write for data



DeZURIK SHOWER CO
SARTELL, MINNESOTA

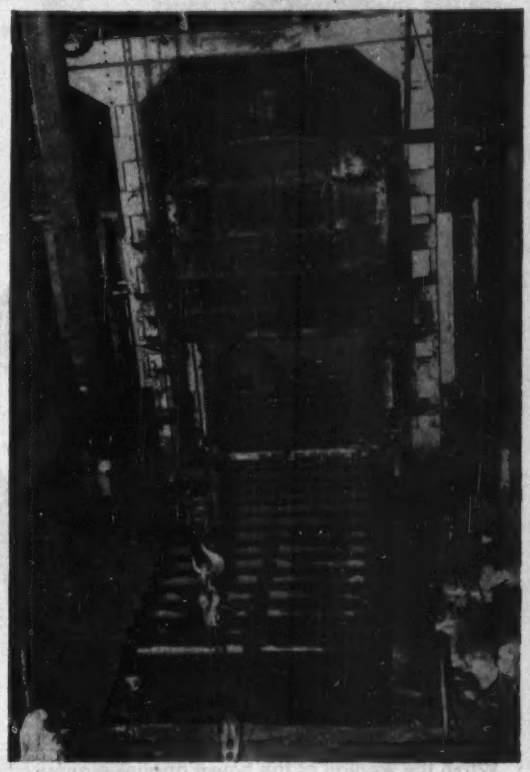
YOU'LL MAKE MORE PROFIT WHEN YOU
FIGHT CORROSION
with ESCO Heat-Treated High Alloy Steel Castings

BEFORE

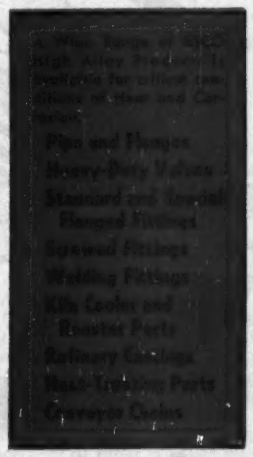
AFTER

These photomicrographs illustrate importance of proper heat treatment in "locking" carbides in solution to produce extra high corrosion resistance.

Laboratory accelerated corrosion test checks result of heat treatment.



ESCO ALLOY CASTINGS OUTLAST OTHERS MANY TIMES!



A big reason for the *unusually high* corrosion resistance of *ESCO* Alloy steel castings is the advanced technique of heat-treating and water quench developed at *ESCO*. It takes only *30 seconds* for a load of steel castings to pass from the oven into an 8000-cubic-foot water quenching tank! Capacity, and speed of quench illustrates a typical *ESCO* answer to a tough production problem. For only with such facilities can you be assured the uniformly high corrosion resistance of *ESCO* Stainless steels.

ESCO has solved many tough heat and corrosion problems for industry as part of its application engineering and foundry service! *ESCO* maintains one of the largest foundry metallurgical laboratories in the country to help you with really tough corrosion problems. Your inquiry is invited. Write for full details or ask for informative Brochure *175*.

ESCO

Offices and Warehouses: Honolulu, Hawaii; Houston, Texas; New York, New York; Los Angeles, San Francisco, California; Seattle, Spokane, Washington; Centralia, Pennsylvania; Eugene, Medford, Oregon; Salt Lake City, Utah. In Canada: Vancouver, B. C., and Toronto, Ontario.

ELECTRIC STEEL FOUNDRY CO.

2145 N.W. 25TH AVE., PORTLAND 10, ORE. 712 PORTER ST., DANVILLE, ILL.

NEVILLE RESINS

are at home in every-day household items

When the woman of the house applies a new coat of aluminum paint to a radiator, or walks on mastic or rubber floor tile, or steps down to the basement on rubber stair-treads . . . she unconsciously proves the worth of Neville Resins! For it's these modern resins that add long life and wear to countless every-day household items, to say nothing of extra beauty and sales appeal so necessary to the manufacturer of such products.

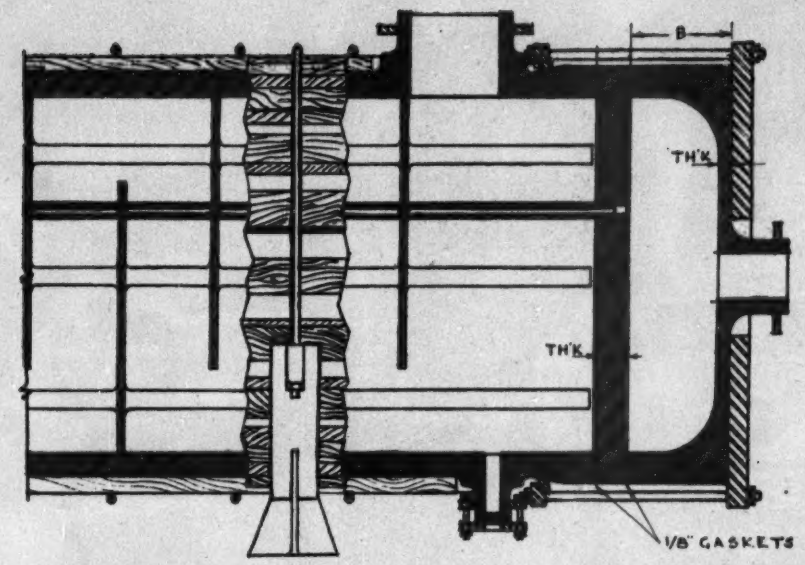
• We will be glad to help you select the right Neville Resin for your particular production need.

THE NEVILLE COMPANY PITTSBURGH 25, PA.

Plants at Neville Island, Pa., and Anaheim, Cal.

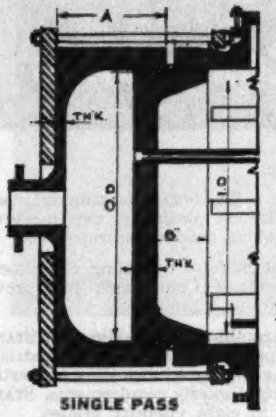
C5

Standard Pressure HAVEG Heat Exchangers . . .



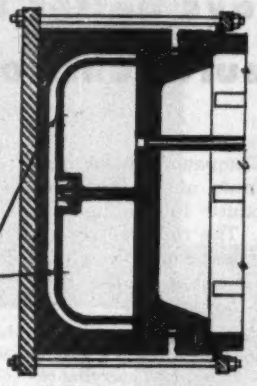
Shell I.D.	Shell O.D.	Shell Th'k.	Working Press Psig	No. Of Tubes	Total Effective Tube Area Sq. Ft. Inside	Total Effective Tube Area Sq. Ft. Outside	Floating Tube Sheet I.D.	Floating Tube Sheet O.D.	Floating Tube Sheet Th'k.	Fixed Tube Sheet Th'k.	No. Of Baffles Liquid	No. Of Baffles Steam	Heads Th'k.	Heads A	Heads B
13¼	13⅜	¼	75	33	65	92	10⅞	12⅞	2½	2½	20	4	⅜	7	5
15¼	15⅜	¼	75	48	96	134	12⅞	14⅞	2½	2½	20	4	⅜	7	5
17¼	17⅜	¼	75	64	135	179	14⅞	16⅞	2½	2½	16	4	⅜	8	6
19¼	19⅜	¼	75	81	159	227	16⅞	18⅞	2½	2½	16	4	⅜	8	6
21¼	21⅜	¼	70	106	208	297	18⅞	20⅞	2½	2½	16	4	⅜	10	8
23¼	23⅜	¼	65	134	263	376	20⅞	22⅞	2½	2½	16	4	⅜	10	8
25¼	25⅜	¼	60	162	318	453	22⅞	24⅞	2½	2½	10	4	⅜	12	10
27¼	30⅜	¼	55	192	376	537	24⅞	26⅞	2½	2½	10	4	1"	12	10
29¼	32⅜	¼	50	235	461	658	26⅞	28⅞	2½	2½	10	4	1"	12	10

*WORKING PRESSURE: MAX. OPERATING PRESSURE TUBES OR SHELL SIDE P.S.I.G.
MAX. STEAM PRESSURE 25 P.S.I.G.

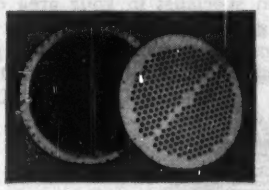


SINGLE PASS

A Haveg Heat Exchanger offers a variety of floating head types. Standard single pass head (left) is interchangeable with multi-pass head (Detail 2). **Note pressure neutralizing holes!** Haveg machines to close tolerances for a tight fit.



MULTI-PASS BAFFLE
DETAIL #2



Coolers — Low pressure chlorine coolers may be supplied up to 10' diameter. All parts are replaceable; any kind of tubes or packing can be used. Multi-pass head features removable baffle. Because Haveg is molded, openings can be made any size or location. Usually steel water heads are supplied with gas passing through the shell, water passing through the tubes. Water heads may be removed without dismantling the Haveg Cooler; replacement of tubes is easily made.

HAVEG is a rigid moldable material (not a coating or lining) made by mixing acid-digested asbestos with special synthetic resins. Thousands of Haveg vessels, molded under heat and pressure at the Marshallton, Delaware factory, have outstanding service records, with excellent and uniform resistance to corrosion. *Now Haveg is available for difficult, high temperature and pressure heat exchange applications.* The use of corrosion-resistant Haveg makes possible the passage of corrosive liquids and gas either through the tubes or shell. Larger, longer-lived heat exchangers, coolers, towers can be rapidly molded and fabricated. Prices are competitive.

INSIDE-OUTSIDE CORROSION?

Resistant to practically all acids, chlorine, salts, many solvents . . . even at boiling temperatures . . . HAVEG gives complete protection on all surfaces of the heat exchanger. Because of chemical inertness and low heat conductivity Haveg is used in end tube sheets—fixed and floating; as the strong outer shell, for heads and baffles. Haveg is a non-conductor; electrolytic corrosion is no problem.

HIGHER HEATS AND PRESSURES

Haveg is resistant to thermal shock and can be used continuously up to 265° F. The pressure range of the new Standard Haveg Heat Exchangers is from 50 to 75 lbs., with a wide safety margin.

COMPLETE SIZE RANGE

Backed by twenty years of manufacturing experience, Haveg already has the molds . . . up to 10' diameter . . . for building any size or style low pressure heat exchanger, cooler, cylindrical tower. Standard Pressure sizes are from 13¼" to 29¼". Single or multiple pass. Special impingement plate protects tube bundle. Interchangeable end covers. Openings molded in at no extra cost; repairs or alterations in the field are easily made. Get information on new Standard Haveg Heat Exchangers, built to your prints, or cooperatively Haveg-engineered with your supplier.

Send coupon today . . . call your Haveg sales office in Atlanta, Chicago, Cincinnati, Cleveland, Detroit, Hartford, Houston, Los Angeles, Seattle, St. Louis. The Haveg Corporation, Newark, Delaware. Factory: Marshallton, Delaware. Wilmington 3-8884.

☐ Send 64-page F-6 Haveg Technical Bulletin.
☐ Send blueprint of Standard Haveg Heat Exchangers.
We're interested in ☐ Coolers ☐ Towers.
☐ Have Haveg Sales Engineer call.

Name_____ Title_____
Company_____
Address_____
City_____ State_____

HAVEG
CORROSION RESISTANT EQUIPMENT
FACTORY: MARSHALLTON, DELAWARE

NEW STANOGEAR
REG. U. S. PAT. OFF.
Compounds

NOW . . . 7 ways better for extreme-pressure lubrication . . .

New and improved STANOGEAR Compounds have been developed to meet the requirements of an increasing variety of tougher extreme-pressure lubricating jobs found throughout industry, today. The result of several years of special research and field test work, these outstanding products have proved in actual service their ability to provide these important advantages:

1. Higher load carrying capacity. Use of improved extreme-pressure additives in STANOGEAR Compounds provide a greater anti-weld property. This results in the higher load carrying capacity which these products have demonstrated in actual service.

2. Superior retention of load carrying capacity. In service tests, STANOGEAR Compounds have proved superior to conventional extreme-pressure lubricants in ability to maintain a high load carrying capacity over extended periods of service.

3. Freedom from objectionable deposits. Appropriate base stocks and additives give STANOGEAR Compounds a high resistance to oxidation, thus minimize the formation of deposits.

4. Excellent storage stability. STANOGEAR Compounds contain compounding ingredients which assure excellent stability both in service and storage.

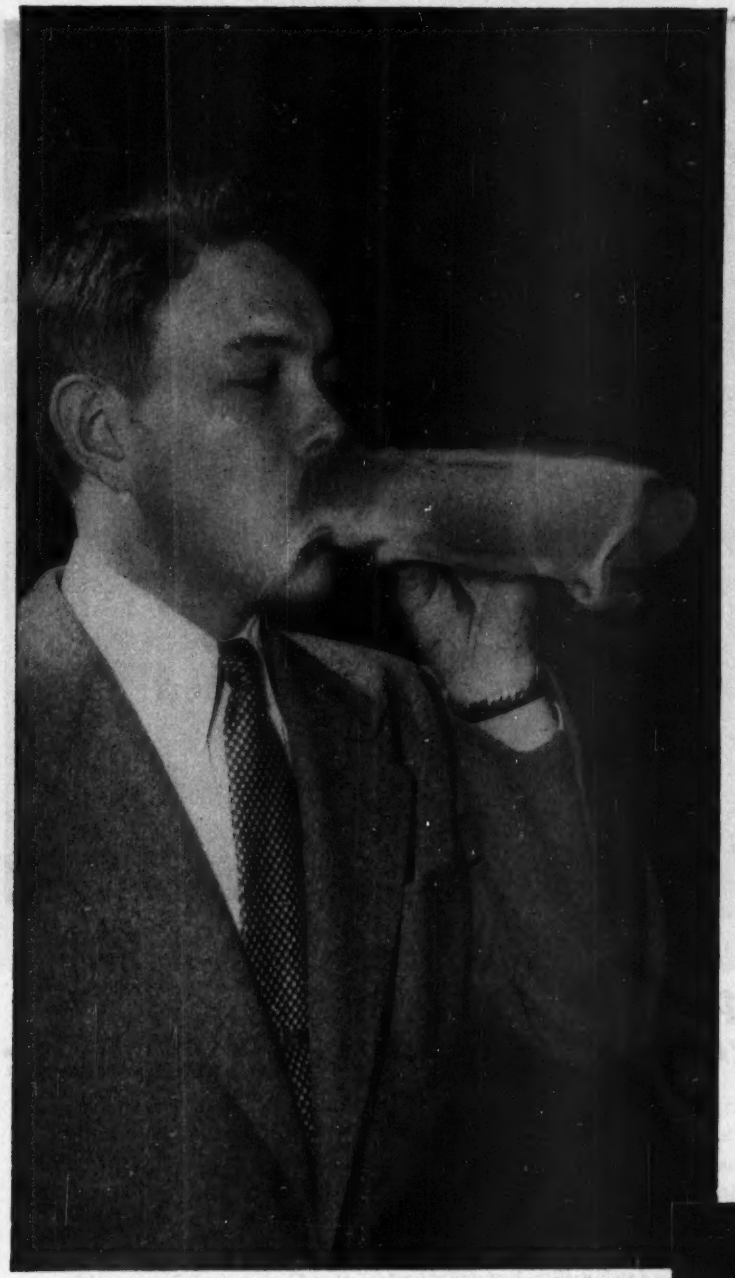
5. Good water separation. STANOGEAR Compounds have demonstrated their superiority to ordinary extreme-pressure lubricants in ability to provide good water separation.

6. Anti-foaming. Under adverse operating conditions, the anti-foam agent in STANOGEAR Compounds has prevented foaming troubles.

7. Versatility. A unique combination of additives in STANOGEAR Compounds equips these products for various industrial gear applications where extreme-pressure lubricating properties are necessary. To meet varying viscosity requirements, STANOGEAR Compounds are available in eight viscosity grades.

The Standard lubrication specialist in your area of the Midwest will be glad to give you more information about the new STANOGEAR Compounds. You need only phone your local Standard Oil office. Or write: Standard Oil Co., 910 South Michigan Avenue, Chicago 80, Illinois

STANDARD OIL COMPANY STANDARD *(Indiana)*



SMOKE BLOWN THROUGH a Norton ALUNDUM* *seamless* tube escapes throughout the tube's entire area. Such a tube gives most efficient filtration and ease of cleaning by back washing. When selecting tubes for your specific application be sure they embody this important feature.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Why Norton seamless tubes give you better filtration

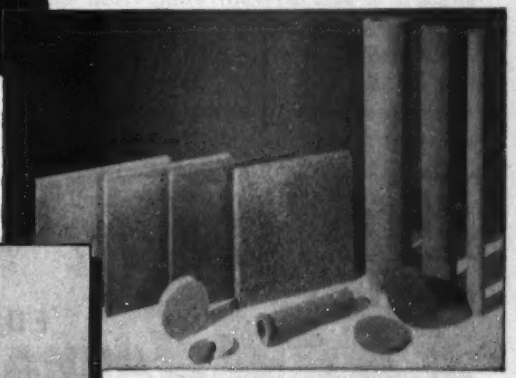
Only Norton ALUNDUM tubes have the seamless construction that means more uniform filtration and enables faster, more thorough cleaning. And like all Norton porous mediums they're made with the patented *controlled structure* process that assures even distribution of pores — in the size and open-pore ratio that best meets your needs.

Cost-cutters over a wide job range

In any form, Norton porous mediums have exceptional resistance to breakage, chipping and acid and alkaline conditions. They're designed to perform better, last longer and cut your operating costs in a wide variety of chemical field applications. For example: filtering water or solvents . . . cutting oils, wine and other liquids . . . reclaiming cleaning fluids and industrial waste . . . in boiler feed water treatment.

Get the whole story

See your Norton Representative for complete facts on how you can get more savings and satisfaction with Norton porous mediums. Or write describing your requirements, to NORTON COMPANY, 506 New Bond St., Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.



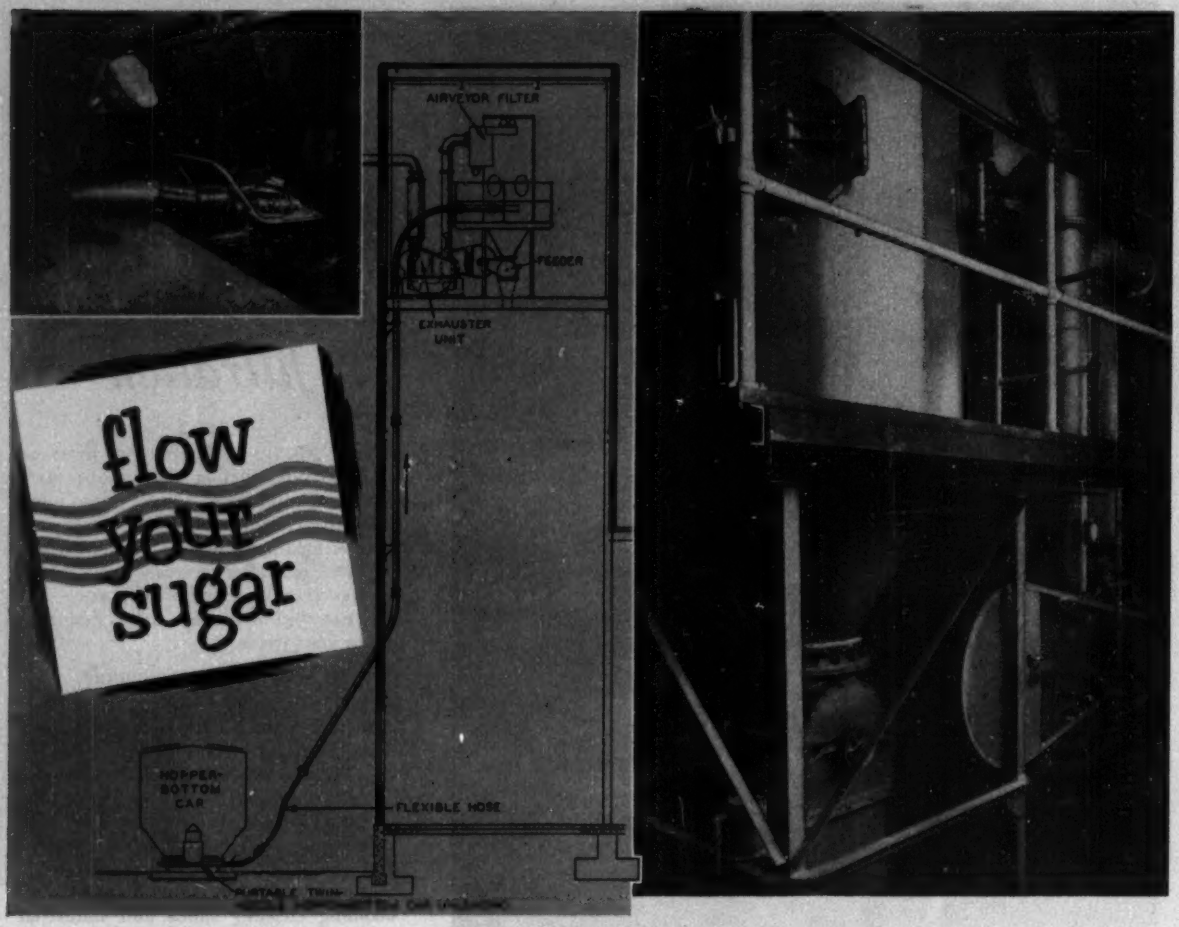
NORTON ALUNDUM POROUS MEDIUMS are available as tubes, plates and discs in a wide range of sizes.

NORTON

POROUS MEDIUMS

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS



Atlas Powder Company speeds corn sugar handling with The AIRVEYOR®

Atlas Powder relies on the Airveyor to speed unloading of refined corn sugar, used for moisture conditioning of many products as well as in chemical synthesis. Large quantities of corn sugar are used in the production of sorbitol, which is a hexahydric alcohol. Atlas was first to use the Airveyor for this bulk handling.

In addition to speedy conveying, the Airveyor piping provides complete protection against contamination, extremely important in the handling of raw materials for making sorbitol.

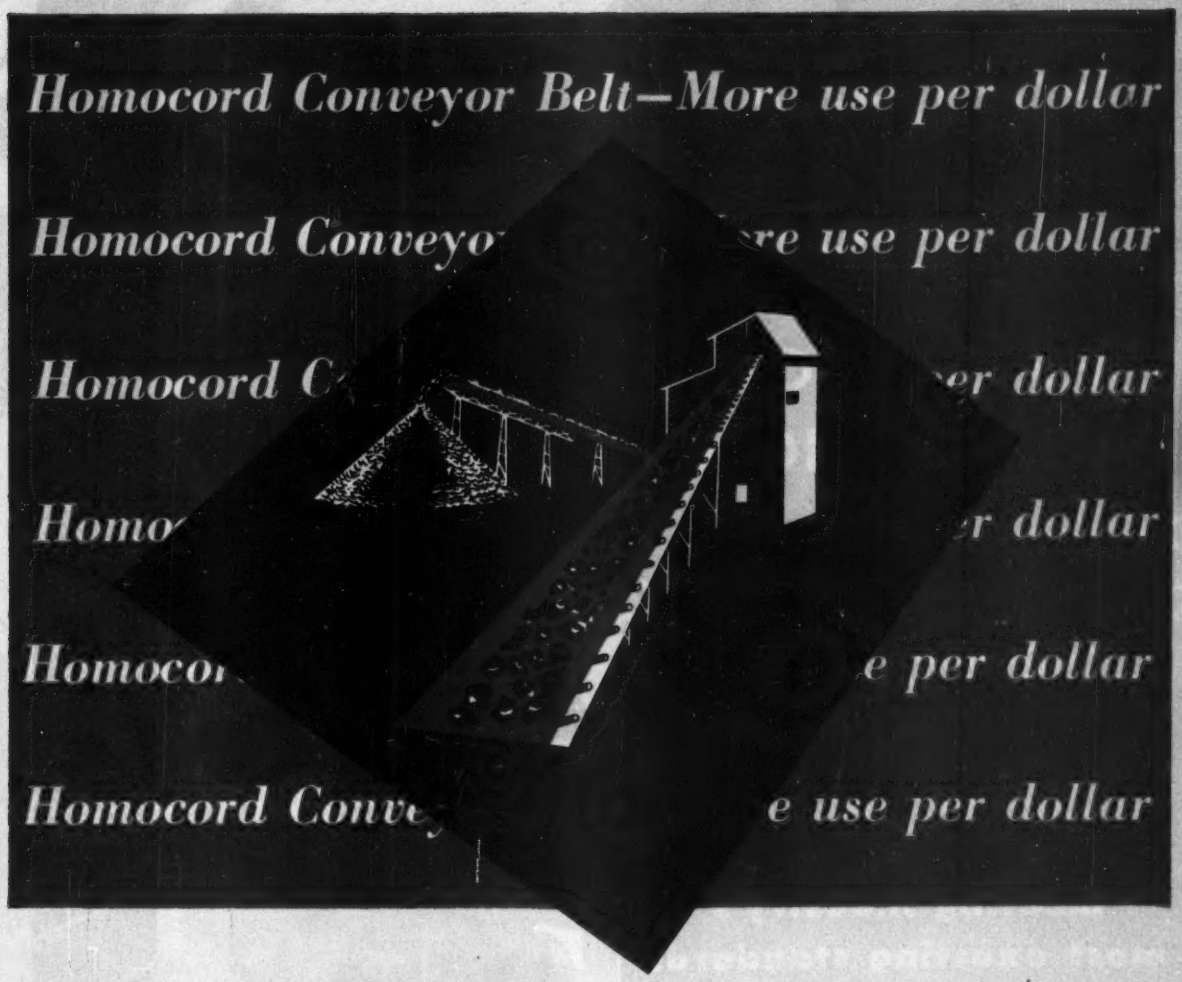
If you are now moving, or planning to move dry, granular materials in bulk, why not call on Fuller for helpful information? Fuller has specialized in air conveying for 26 years. Write today!

Fuller
CONVEYS BY AIR
...NOTHING MOVES BUT THE MATERIAL

FULLER COMPANY, Catasauqua, Pa.
Chicago 3, 120 S. LaSalle St.
San Francisco 4, 420 Chancery Bldg.
Los Angeles 36, 5225 Wilshire Blvd.
Birmingham 3, Ala., Brown-Marx Bldg.

A-161
1851

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS . . . COMPRESSORS AND VACUUM PUMPS . . . FEEDERS AND ASSOCIATED EQUIPMENT


Homocord Conveyor Belt—More use per dollar
Homocord Conveyo re use per dollar
Homocord C er dollar
Homo r dollar
Homoco e per dollar
Homocord Conve e use per dollar

MORE SHOCK-LOAD CUSHIONING . . . The extra body-cushion built into **Homocord** Conveyor Belt dissipates even the shock of sharp impact from large lumps of coal, rock and ore . . . A Homocord Conveyor Belt resists gouging and cutting. It lasts longer . . . and hauls more too—because it troughs naturally and trains easily in the idlers. That's MORE USE PER DOLLAR. Another R/M Conveyor Belt, Ray-Man "F", is designed particularly for underground mining where pulleys are small and great flexibility and tear resistance are needed. Both of these R/M belts give you long life on the job, MORE USE PER DOLLAR. Ask the R/M distributor for Bulletins 6906 and 6915. R/M field engineers back him up to save you money—not only in conveyor belts, but in hose, transmission and V-belts.

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

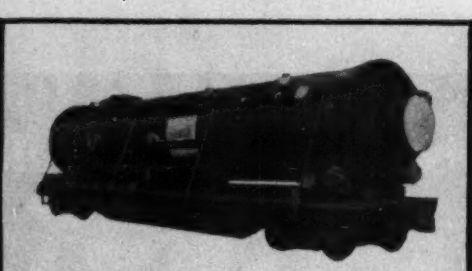
RAYBESTOS-MANHATTAN, INC.

Enroute

GRAVER

PRECISION FABRICATIONS

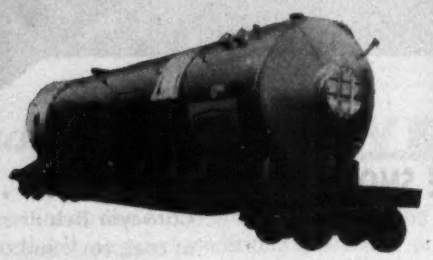
meeting Industry's most exacting standards



STAINLESS CLAD TOWER

CARBON STEEL TOWER

SOLID STAINLESS TOWER



ALUMINUM TOWER

Where precision craftsmanship is required in tough-to-handle metals, you may rely on Graver. Nearly a century of experience in building tanks, combined with resourceful creative engineering, helps to explain the continuous flow of Graver vessels to the process and petroleum industries.

This is especially true in the fabrication of towers and vessels of alloys and aluminum. Here Graver's rigid quality control, sound welding research, and ability to work to close tolerances result in highest quality products. For *really difficult jobs,* look to Graver!

GRAVER

PROCESS VESSELS

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • CHICAGO • PHILADELPHIA • ATLANTA

DETROIT • CLEVELAND • PITTSBURGH • HOUSTON

CATASAUQUA, PA. • SAND SPRINGS, OKLA. • CASPER, WYO.

Set 'em and forget 'em

The valve that seals tightly, operates easily, and requires the least maintenance and attention deserves top priority. That's the Cameron Non-Lubricated Lift Plug Valve.

It seals tightly because of a novel mechanical design which employs a seat separate from the body which is, therefore, not affected by pressure forces and line strains. It operates easily because of the lift-turn-reseat principle which eliminates friction between the plug and seat. It requires minimum maintenance because it does not depend on lubricant to effect a seal or for easy operation. And being non-lubricated, it also eliminates the possibility of contaminating line products.

that's the beauty of

Cameron

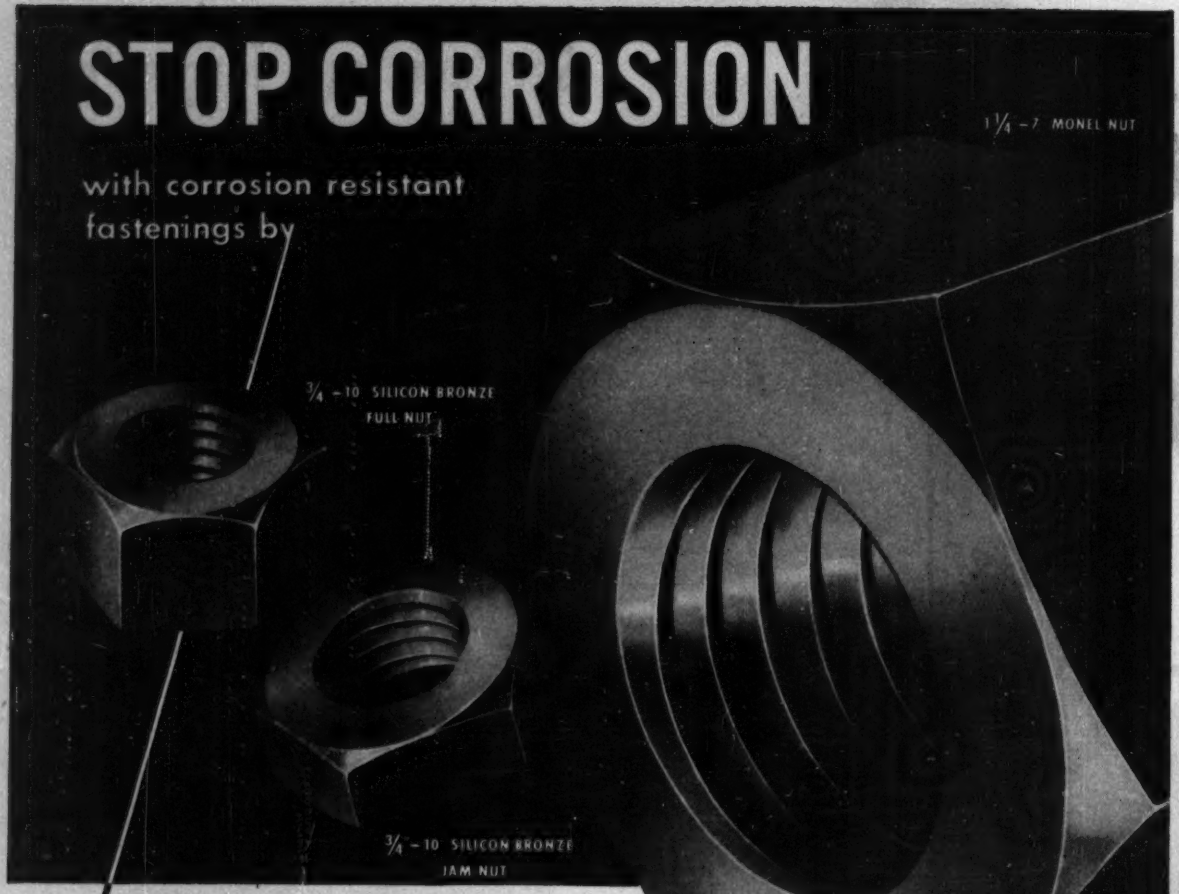
NON-LUBRICATED
LIFT-PLUG VALVES

Cameron
IRON WORKS, INC.

C.I.W., INC., P. O. Box 1212, Houston, Texas
EXPORT: 7912 Empire State Bldg.
New York, N. Y.

STOP CORROSION

with corrosion resistant fastenings by



HARPER

The cancer of corrosion is constantly at work, eating away the life of the equipment you manufacture. The H. M. Harper Company specializes in "Everlasting Fastenings" to combat corrosion. Bolts — nuts — screws — rivets — studs — washers of brass—naval bronze—silicon bronze—Monel—nickel—copper—aluminum—stainless steel—and the newer high temperature alloys.

Skilled engineers and metallurgists, backed by 30 years of experience, are available to work with you on the design and production of fastenings to solve the tough corrosion and assembly problems you may be facing.

In every market area, you will find Harper Branch Offices and Distributors ready to give you prompt service. Over 7,000 items are carried in stock, making it possible for you to fill all your requirements from one source, bringing you these advantages—one order to write—one account to keep —one bill to pay.

THE H. M. HARPER COMPANY
8206 Lehigh Ave., Morton Grove, Ill.

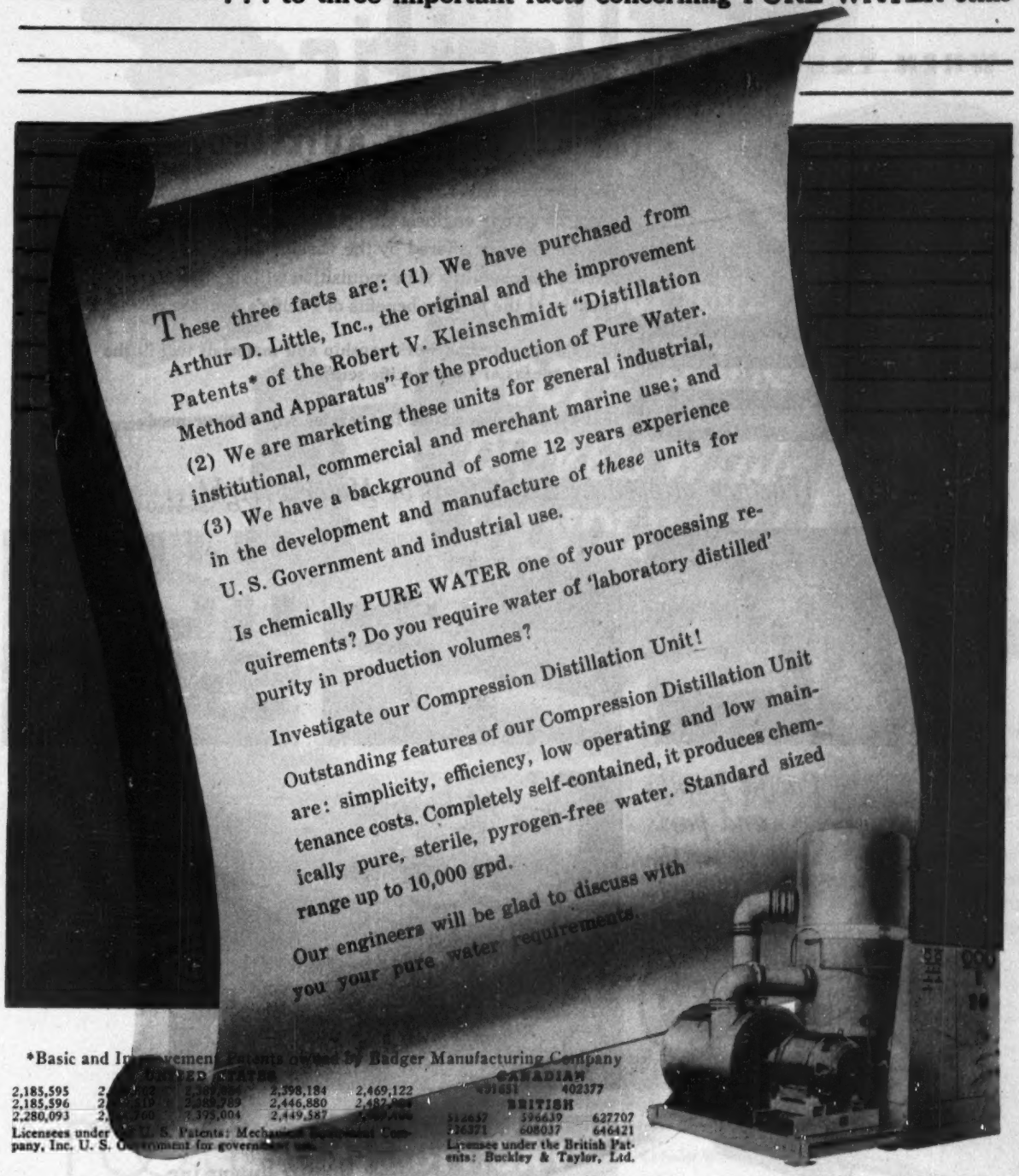
HARPER
EVERLASTING FASTENINGS

SPECIALISTS IN CORROSION RESISTANT FASTENINGS

BRASS • SILICON BRONZE • NAVAL BRONZE • MONEL • NICKEL • COPPER • ALUMINUM • STAINLESS STEEL

Your Attention, Please!

. . . to three important facts concerning PURE WATER stills



These three facts are: (1) We have purchased from Arthur D. Little, Inc., the original and the improvement Patents* of the Robert V. Kleinschmidt "Distillation Method and Apparatus" for the production of Pure Water. (2) We are marketing these units for general industrial, institutional, commercial and merchant marine use; and (3) We have a background of some 12 years experience in the development and manufacture of *these* units for U. S. Government and industrial use.

Is chemically PURE WATER one of your processing requirements? Do you require water of 'laboratory distilled' purity in production volumes?

Investigate our Compression Distillation Unit!

Outstanding features of our Compression Distillation Unit are: simplicity, efficiency, low operating and low maintenance costs. Completely self-contained, it produces chemically pure, sterile, pyrogen-free water. Standard sized range up to 10,000 gpd.

Our engineers will be glad to discuss with you your pure water requirements.

*Basic and Improvement Patents owned by Badger Manufacturing Company

UNITED STATES

2,185,595 2,[illegible] 2,398,184 2,469,122
2,185,596 2,[illegible] 2,446,880 2,487,[illegible]
2,280,093 2,[illegible] 2,449,587 2,[illegible]

Licensees under the U. S. Patents: Mechanical Equipment Company, Inc. U. S. Government for governmental use.

CANADIAN

[illegible] 402377

BRITISH

[illegible] 596639 627707
[illegible] 608037 646421

Licensee under the British Patents: Buckley & Taylor, Ltd.

Badger Manufacturing Company

230 BENT STREET • CAMBRIDGE • MASS.

Double Assurance..

WHEN YOU SPECIFY Pacific

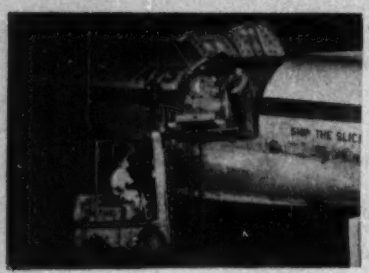
PRECISION BUILT PUMPS

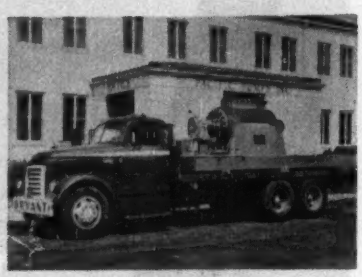
The requirements for your specific service having been made known by your engineering specifications you will look carefully into the benefits offered by the various bidders. After looking, it's dollars to doughnuts your requisition will specify *"Pumps by Pacific"* because of the greater benefits of Pacific's *double assurance.*

Assurance that Pacific's design, workmanship and materials will fit the requirements of your specific service.

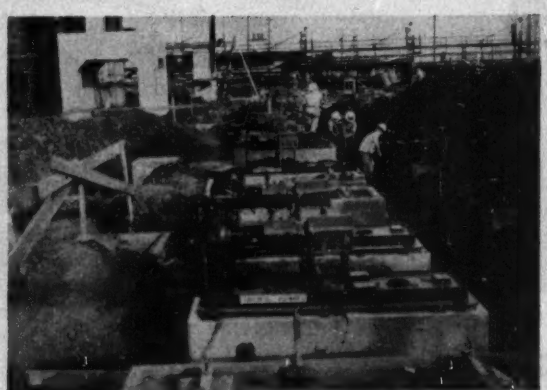
Assurance that Pacific's dependable fast service will fit your needs.

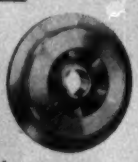
Whether shipped by Air...Rail or Motor Freight...





Pacific Pumps and parts will be on the job early





Order recieved November 2 for 2 chrome steel impellers with heat-treated and hardened wearing rings—Parts shipped November 6

Order received 10:30 a.m. Wednesday for a Pacific multi-stage rotor—Rotor shipped 8 a.m. Friday, 46½ hours later

CP-6

PACIFIC *Precision Built* **PUMPS**

Pacific Pumps inc.

HUNTINGTON PARK, CALIFORNIA

Export Office: Chanin Bldg., 122 E. 42nd St., New York

Offices in All Principal Cities

Line-O-Power Straight Line Drive (Foot Mounted)
Line-O-Power Right Angle Drive (Flange Mounted)
Maxi-Power Helical Gear Drive
Foote Bros.-Louis Allis Horizontal Gearmotor
Hygrade Worm Gear Vertical Drive
Hygrade Worm Gear Horizontal Drive
Foote Bros.-Louis Allis Vertical Gearmotor
name your job...
FOOTE BROS. DRIVES WILL HANDLE IT!

At Foote Bros. you will find a complete line of enclosed helical and worm gear drives for every job. Ratios and capacities to answer every speed reduction need. Also available to assure long and satisfactory service is a complete line of Foote Bros.-Louis Allis Gearmotors, both vertical and horizontal.

Foote Bros. offers these advantages: Nearly 100 years of design, engineering and manufacturing experience—the latest in gear-cutting techniques—better control of materials. Modern production techniques at three large plants assure superior drives for every power transmission requirement.

Mail coupon for information.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 South Western Boulevard, Chicago 9, Illinois

Foote Bros. Gear and Machine Corporation
Dept. CE, 4545 South Western Boulevard
Chicago 9, Illinois

Please send me information on the following:

☐ Line-O-Power Drives ☐ Maxi-Power Drives
☐ Hygrade Drives ☐ Worm-Helical Gear Drives
☐ Foote Bros.-Louis Allis Gearmotors

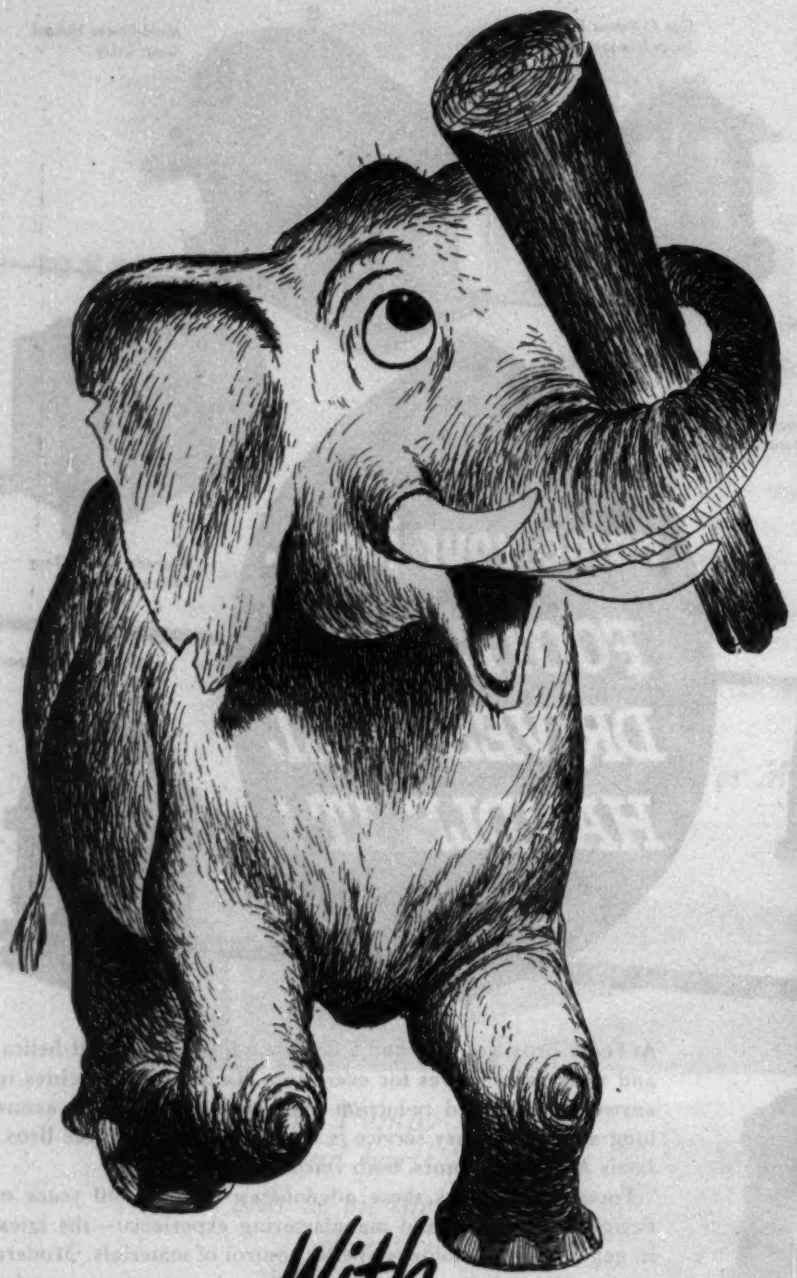
Name.....

Company.....

Address.....

Position.....

City.....*Zone*.....*State*.....



BACKED BY continuing research at the Esso Laboratories and processed by closely controlled, modern refining methods . . . Esso Solvents offer high quality combined with uniformity and dependability.

YOU GET ALL 6 OF THESE IMPORTANT FEATURES WITH ESSO SOLVENTS

1. **Multi-storage availability** — water terminals in industrial centers.

2. **Uniformity** — made in modern refineries from carefully selected crude oil sources.

3. **Economy**—A storage facility near you for low freight cost and quick delivery.

4. **Controlled evaporation** — available in a wide range of evaporation rates with precise characteristics to meet your requirements.

5. **Solvency** — Esso aliphatics and Solvesso aromatics cover both high and low solvency ranges.

6. **Modern handling methods** — separate tank storage, pumping lines, tank cars and trucks, are used throughout in all Esso Solvent handling operations.

Esso Solvents: versatility and dependability with controlled high quality.

With Esso Solvents you get dependable performance too!

ESSO

PETROLEUM SOLVENTS

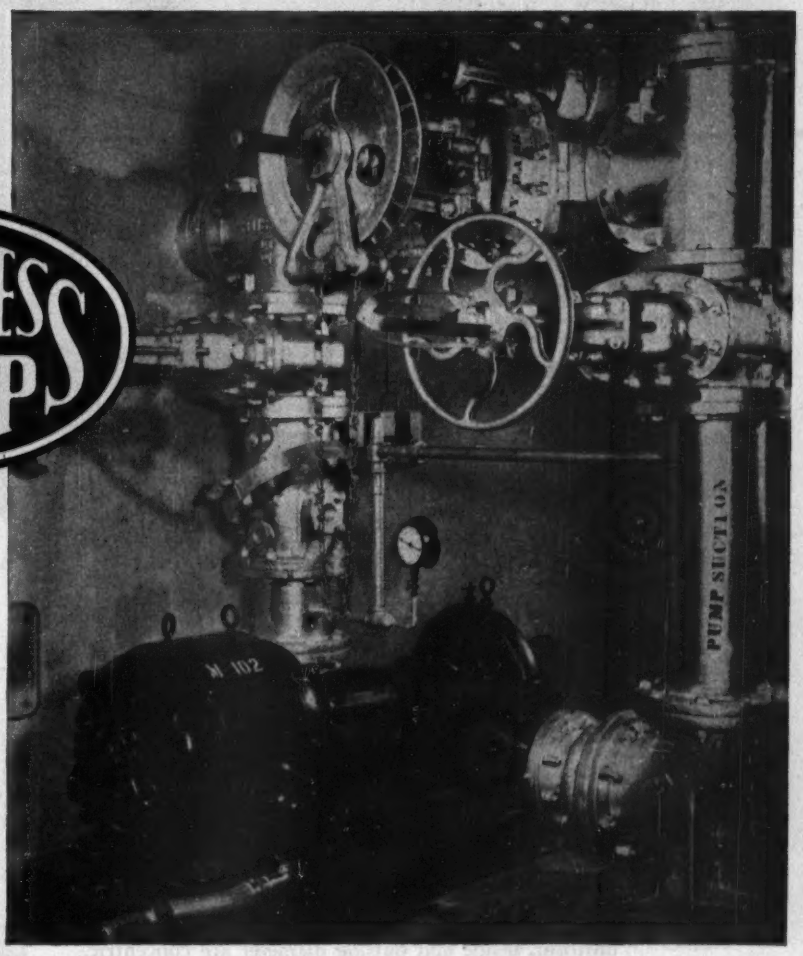
SOLD IN: Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY
Boston, Mass. — New York, N. Y. — Elizabeth, N. J.
Philadelphia, Pa. — Baltimore, Md. — Richmond, Va.
Charleston, W.Va.—Charlotte, N. C.—Columbia, S. C.
Memphis, Tenn.—New Orleans, La.

Peerless DEPENDABILITY

STOPS *Pump Troubles* BEFORE THEY START—

PEERLESS PUMPS



PEERLESS TYPE A SINGLE STAGE, SPLIT CASE HORIZONTAL PUMPS

General Characteristics

CAPACITIES: Up to 70,000 g.p.m.

HEADS: Up to 300 feet.

DRIVES: Direct-connected electric motor; belted drives; diesel, natural gas, and gasoline engine; steam turbine; combination drives.

TEMPERATURES: Handles liquids up to 300°F.

DOUBLE & SINGLE SUCTION: (Double Suction Sizes 1¼" through 48"; Single Suction Sizes 2" & 3").

BOTTOM SUCTION: (Bottom Suction Sizes 12" through 42").

BALL BEARING: Radial and thrust bearings.

THE QUALITY PEERLESS BUILDS IN *is returned to you in service*

TYPE A *for All purpose pumping*—Peerless Type A pumps can be used in the widest variety of general pumping services, handling water and light alkaline fluids, where no solids are in suspension.

TYPE A *for Advanced design*—Peerless Type A pumps are of the ball bearing type with horizontally split cases, for ease of inspection and maintenance. All are furnished with double suction impellers.

TYPE A *for All capacities and heads*—Peerless Type A pumps offer users greatest range in capacities, delivering up to 70,000 g.p.m. Type A characteristics permit pumping against heads up to 300 feet.

TYPE A *for Ample safety factor*—Oversize shafts, heavy duty ball bearings, wear rings and shaft sleeves all contribute to ample protection against wear, afford a high factor of safety in operation and assure reliable service and extended pump life.

TYPE A *for Augmented service life*—Type A pumps are fully tested in Peerless' modern hydraulic testing laboratory, which can duplicate the field conditions under which the pump will be used. Experienced Peerless trained engineers, located near you are at your service to see that the Type A pump matches or exceeds your requirements.

TYPE A *for Accuracy in construction*—Bearing seats are cast and bored integral with the case, assuring permanent alignment. Parts are machined to gage on an interchangeable part system.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Factories: Los Angeles, Calif. and Indianapolis, Indiana.
Offices: New York; Atlanta; Chicago; St. Louis; Indianapolis; Phoenix; Fresno; Los Angeles; Tulsa; Dallas; Plainview; and Lubbock, Texas; Albuquerque, New Mexico.
Distributors in Principal Cities; Consult your Telephone Directory.

PEERLESS PUMPS fmc

••••MAIL COUPON FOR BULLETIN

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
301 West Avenue 26, Los Angeles 31, California

Please send a copy of Type A Bulletin No. B-1300.

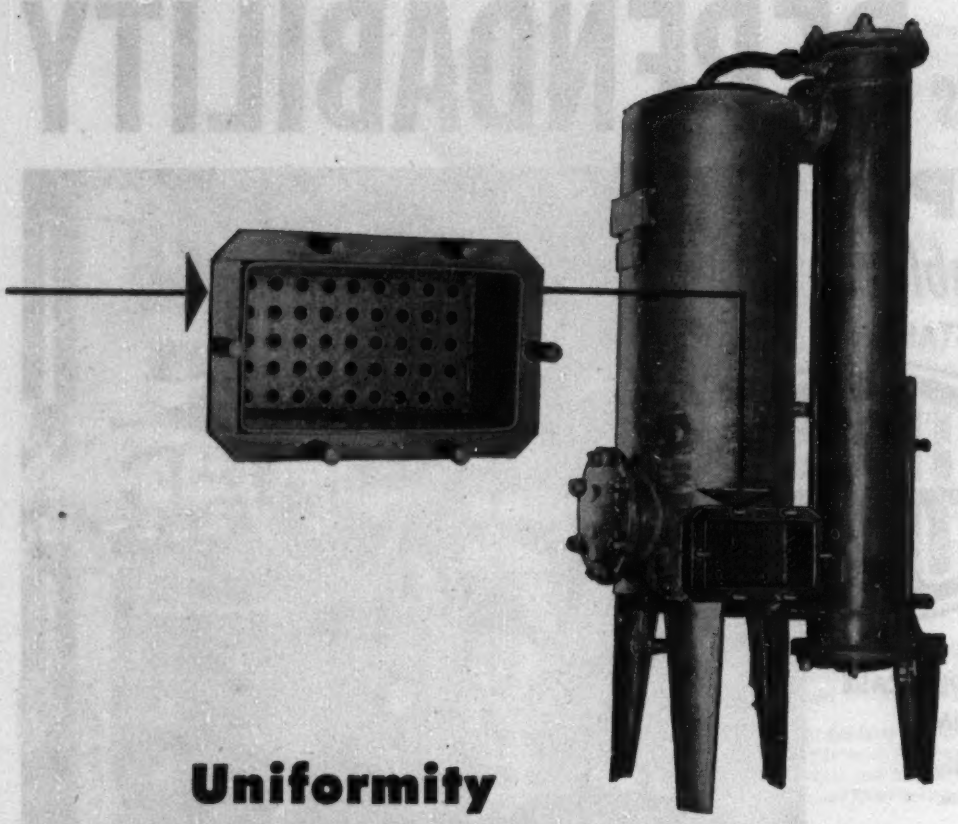
NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

CHEM. ENG.



Uniformity helps cut tubing costs

Butler Mfg. Company of Kansas City was having trouble installing heat exchanger tubes in dry cleaning solvent recovery stills. One headache was tube concentricity. Another was the wide variation of both inside and outside diameter dimensions. Still another was the variation of physical properties.

Switching to Republic ELECTRUNITE Pressure Tubes solved the problem. Tubes are uniformly round. Because wall thickness is uniform, inside and outside diameter are concentric.

Results: Tubes slide in quickly. They expand easily with less danger of over or under-rolling. And because they are fully annealed, uniformly ductile ELECTRUNITE Pressure Tubes roll-in and bead fast . . . make tight joints . . . save time.

On your next job . . . tubing or re-tubing . . . boiler, condenser or heat exchanger . . . it will pay you to specify ELECTRUNITE Pressure Tubes. Available in carbon or Enduro Stainless Steel analyses. Write for Bulletin CEC-53.

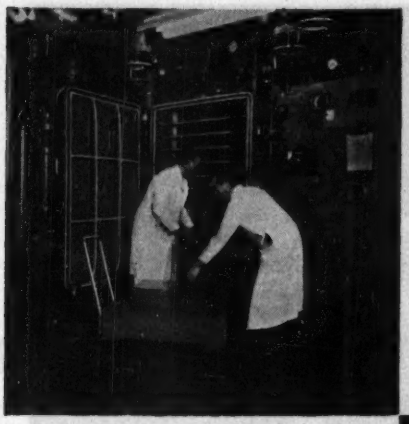
STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
2013 EAST 131st STREET • CLEVELAND 8, OHIO

REPUBLIC STEEL

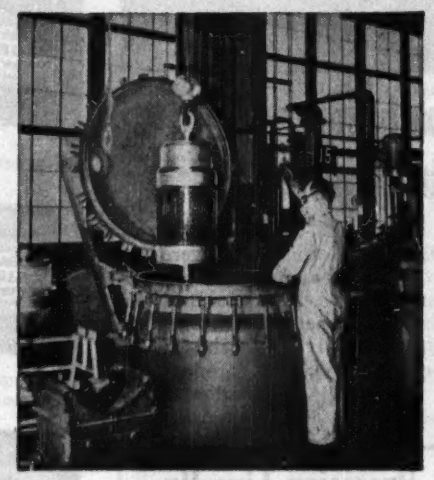
Republic
ELECTRUNITE
BOILERS, CONDENSER AND HEAT EXCHANGER TUBES

ELECTRUNITE . . . THE ORIGINAL ELECTRIC WELDED BOILER TUBE

Stokes equipment is used for the shelf-drying of procaine penicillin under vacuum at the New Brunswick, N. J. plant of E. R. Squibb & Sons.



One of the uses for the complete custom-built installation of Stokes vacuum freeze-drying equipment in Pitman-Moore Company's new million-dollar plant at Indianapolis, Ind. is to produce gamma globulin to combat poliomyelitis. One of the steps is drying the material from its frozen state. Operators are shown removing trays of gamma globulin from Stokes freeze-dryers at temperatures of 40° below zero F.



Diesel locomotive armature being removed, after impregnation, from Stokes high vacuum impregnating tank in the San Bernardino, Calif., plant of Atchison, Topeka & Santa Fe Railway. Electric motors for the Santa Fe's "Chief" and "Super Chief" develop such excessive heat that ordinary insulation would swell or burst, causing the rotors to "freeze" in the mounting. By impregnating these rotors with protective resins under high vacuum in Stokes impregnators, each turn of wire is held rigidly in place and the motors operate without interruption.

IN VACUUM ENGINEERING... NOTHING SUCCEEDS LIKE SUCCESS!

Stokes' success in the application of Vacuum Engineering to industry is based on the practical experience of many years in the study and practice of vacuum processing.

The first commercial production of blood plasma to save human lives was initiated by Stokes engineers on Stokes vacuum processing equipment. Hog cholera serum to protect and increase the world's meat supply is largely produced on Stokes equipment by vacuum processing methods. More recently, Stokes freeze-drying equipment has been used to produce gamma globulin, the first real ray of hope in the fight against paralytic poliomyelitis.

New markets for low-cost metals and plastics which simulate more costly pieces have been created through the use of Stokes vacuum metallizing equipment. Electric and electronic equipment is now processed in Stokes vacuum impregnation units to prepare it for the heavy loads and exacting requirements of modern electric and electronic practice.

Stokes is FIRST in Vacuum Engineering by virtue of fifty years of experience in the manufacture of practical production equipment. You are invited, without obligation, to consult with Stokes Vacuum Engineers on any phase of Vacuum Engineering — drying, freeze-drying, metallizing, impregnation or vacuum furnace processing—which can be applied to your business.

F. J. STOKES MACHINE COMPANY, PHILADELPHIA 20, PA.

STOKES

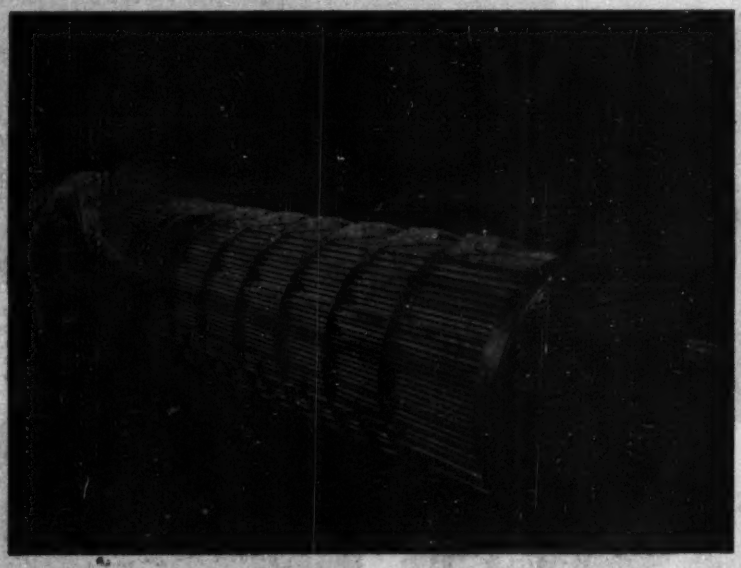
STOKES MAKES: High Vacuum Equipment, Vacuum Pumps and Gages / Industrial Tabletting, Powder Metal and Plastics Molding Presses / Pharmaceutical Equipment

PROCESS EQUIPMENT NEWS

PUBLISHED BY FABRICATED PRODUCTS DIVISION, THE M. W. KELLOGG COMPANY JULY 1953

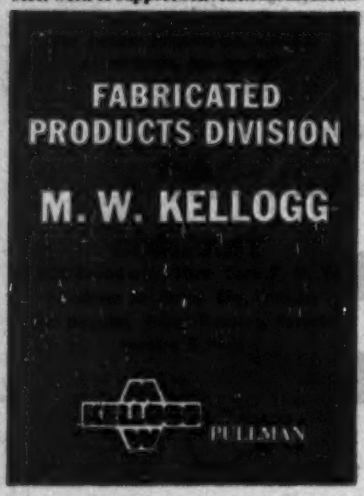
Exchanger Shops Altered to Handle Increased Demands of Chemical Industry . . .

For many years, Kellogg's Exchanger Fabricating Shops in Jersey City concentrated on supplying exchangers for Kellogg's many refinery construction jobs and for making critical exchangers for specific outside customers. However, during World War II the facilities were expanded to produce exchangers for a host of marine and general chemical applications, as well as to handle business from other contractors. Since then this general demand has continued to increase . . . and the Shops have just been rearranged to insure prompt deliveries.



Hydro-Ejector Operates in Number of Refineries

Shown here is the new Kellogg portable Hydro-ejector now in use by a number of refiners and chemical plant operators. The Hydro-ejector removes and inserts the largest bundles with ease . . . eliminates costly steel work to support conventional methods.



Nearly 200 Stainless Exchangers Completed in Less Than 18 Months

This stainless steel tube bundle, being inspected prior to insertion in its stainless-clad shell, is one of 187 such exchangers recently completed by Kellogg for a huge new chemical plant. The last unit was shipped less than 18 months after the order was received.

While there were minor variations in designs, the illustrated unit is typical of the exchangers involved. Carrying twenty foot long tubes and measuring almost 48 inches in diameter, it will handle highly corrosive materials. The tubes are of type 316 stainless and the tube sheets and baffles are of type 304. The shell is stainless-clad.

Condenser Bundles Prove Precision Line-Up of Tube Sheets and Baffles Essential

Undesirable stresses can readily be built-into any exchanger during fabrication if tubes do not slide through baffles and into tube sheets with ease.

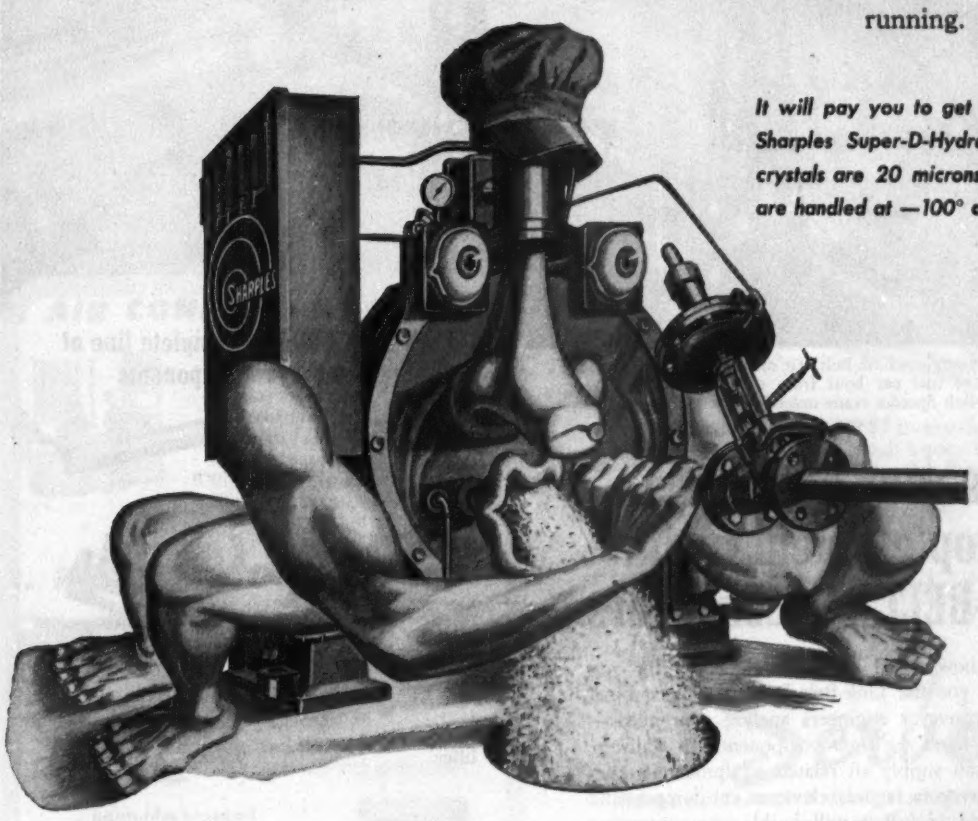
Only with precision line-up prior to inserting tubes is it possible to insure that the tubes will enter the bundle without use of excessive force.

Kellogg's close tolerance machining of tube holes and painstaking line-up make the insertion of tubes a relatively easy task in the fabrication of this propane condenser bundle. When complete it will contain 880 admiralty tubes. Baffles are of naval brass and approximately 33" in diameter.

Built ruggedly for tough crystal dehydration service—that's the reason why performance records of over 200 Super-D-Hydrators show low operating costs and high purity dry crystals. Every detail has been engineered to withstand the most severe operating conditions. Oversize bearings, heavy duty basket, rugged knife and leveller, all combine to give dependable continuous service.

The Super-D-Hydrator is extremely flexible. Instrumentation control provides quick, easy adjustment for variations in slurry concentration, flow rate, and crystal size—independently, and while the machine is running.

BRUTE FOR CRYSTALS



It will pay you to get the facts about The Sharples Super-D-Hydrator — whether the crystals are 20 microns or 4 mesh in size are handled at —100° or 400° F.

Just write Sharples.

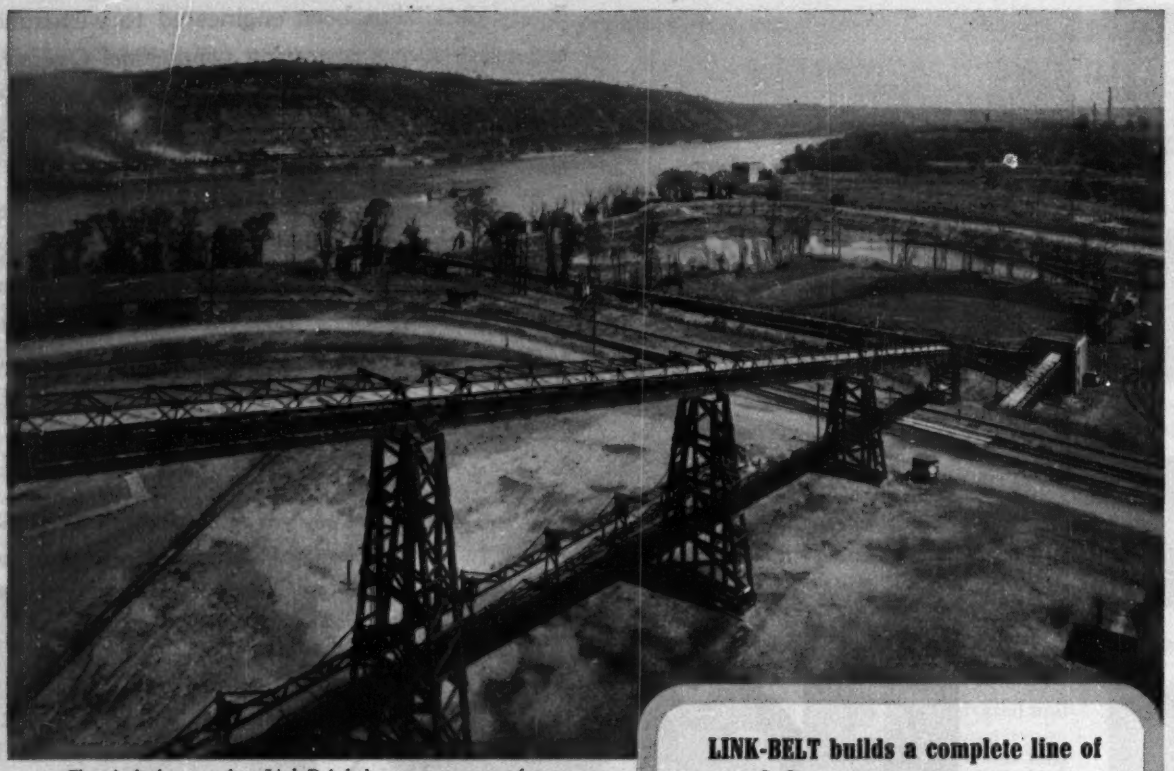
SHARPLES

THE SHARPLES CORPORATION • 2300 WESTMORELAND STREET • PHILADELPHIA 40, PENNA.

NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • NEW ORLEANS • SEATTLE • LOS ANGELES • SAN FRANCISCO • HOUSTON

Associated Companies and Representatives throughout the World

TOTAL ENGINEERING



Chemical plant employs Link-Belt belt conveyor system for moving 450 tons of coal per hour from river barges to storage bunkers. Link-Belt Speeder crane unloads barges in background.

It's your assurance of top efficiency with LINK-BELT belt conveyors

HERE'S how "total engineering" works for you when you use Link-Belt Belt Conveyors. First, Link-Belt conveyor engineers analyze your needs—then recommend the *right* components. In addition, Link-Belt can supply all related equipment — other types of conveyors, feeders, elevators, car dumpers and shakers. And Link-Belt will build your supporting structures and enclosures . . . install the job completely, if desired. Call the Link-Belt office near you for any engineering assistance you need.

LINK-BELT

BELT CONVEYOR EQUIPMENT 13.380-F

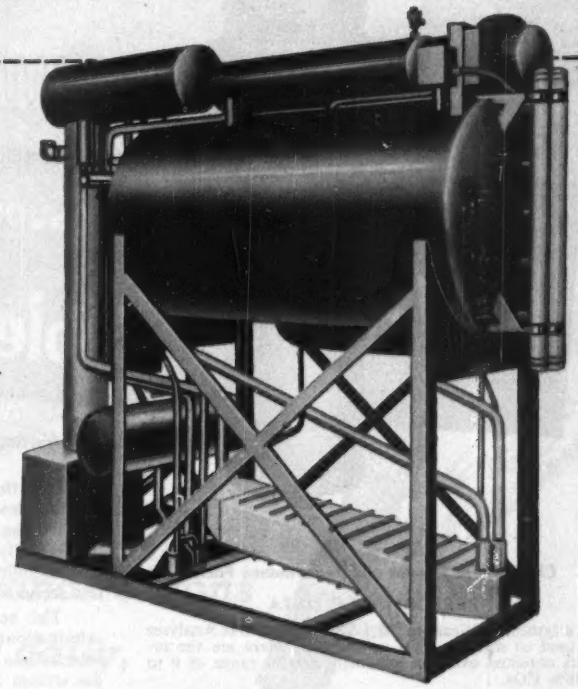
LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales offices in Principal Cities.

LINK-BELT builds a complete line of belt conveyor components

Solve cooling problems with waste heat or low-cost steam!

FLEXIBLE SERVEL WATER CHILLER

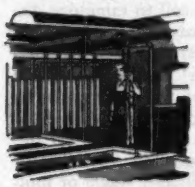
meets all 3 cooling needs



1. AIR CONDITIONING

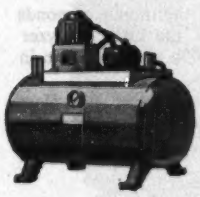
The adaptable Servel 25-ton Water Chiller—operating on any source of steam—uses water as the refrigerant to provide economical temperature and humidity control in large buildings and factories. No expensive duct systems are required!

2. PROCESS COOLING



Because it operates with no moving parts on the time-proved absorption refrigeration principle, you can depend upon the Servel 25-ton Water Chiller for continuous high-efficiency cooling of liquids for various manufacturing and formulating processes.

3. INDUSTRIAL PRECOOLING



You can use the unusually flexible Servel 25-ton Water Chiller to precool air for increased capacity and improved performance of air compressors and internal combustion machines. The Water Chiller also serves other money-saving precooling purposes.

5-YEAR WARRANTY! Every Servel 25-ton Water Chiller is backed by a full 5-year warranty. Because it has no moving parts, the Servel Water Chiller operates quietly and without vibration. Add to these advantages its extremely compact size and light floor weight and you'll appreciate why it can be installed on any floor with most economical piping arrangement. May be installed singly or in multiple as required. Mail the coupon below today for complete information.

Servel

the name to watch for great advances in . .

AIR CONDITIONING ✓ REFRIGERATION

MAIL THIS COUPON TODAY

SERVEL, INC., Dept. CE-7, Evansville 20, Indiana

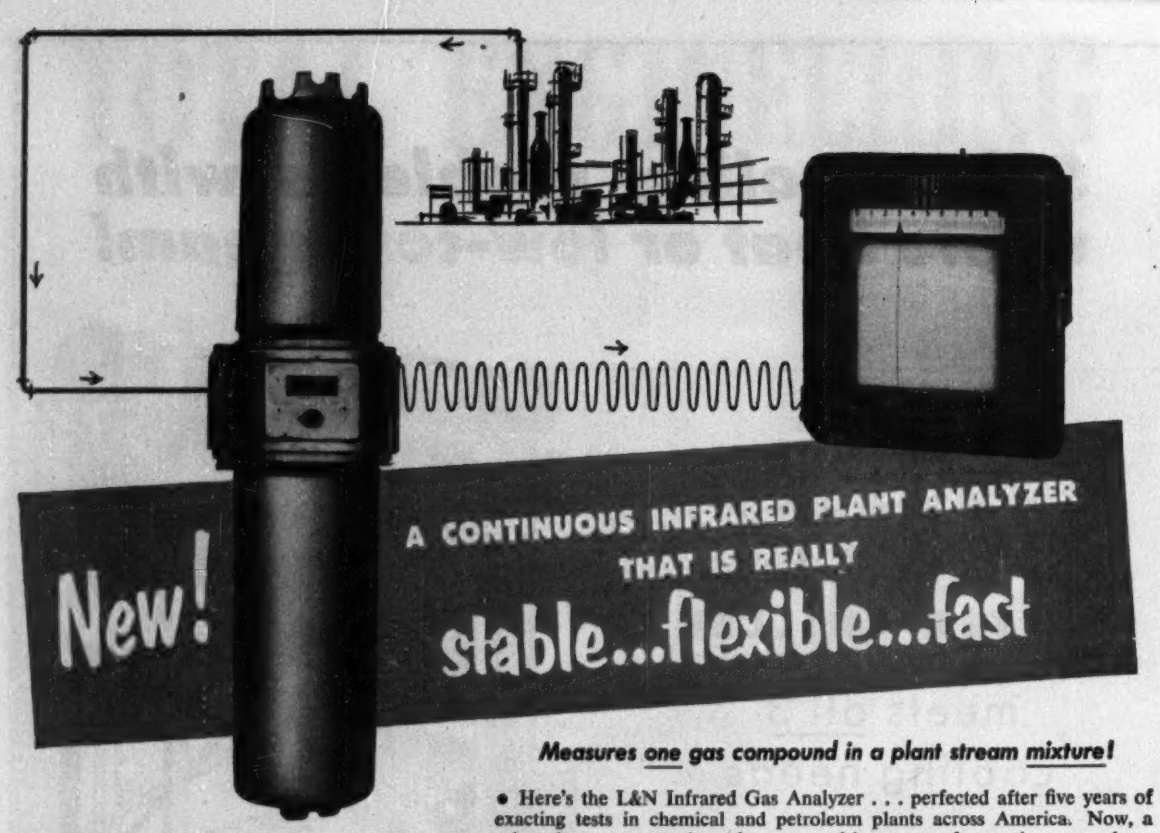
Please send me further information about application flexibility of the Servel 25-ton Water Chiller.

Name_____

Firm_____

Address_____

City_____ Zone___ State_____



New! A CONTINUOUS INFRARED PLANT ANALYZER THAT IS REALLY stable...flexible...fast

Measures one gas compound in a plant stream mixture!

• Here's the L&N Infrared Gas Analyzer . . . perfected after five years of exacting tests in chemical and petroleum plants across America. Now, a selected gas compound can be measured by means of a continuous analyzer that is really stable, flexible and fast. Here's permanent 7-day stability. Here's the flexibility of a range-changing dial. Here's a measuring speed of only a few seconds.

This new L&N Infrared Gas Analyzer also provides high measuring discrimination. It is so designed that it measures radiation absorbed only by the selected gas compound. Here's how! Compounds in the continuously-flowing gas stream absorb portions of radiation passing through a sample cell. The radiation absorbed by the background gases either cancels out automatically or is blanketed by a filter cell, eliminating the effect of any interfering compounds. The L&N Analyzer then compares the remaining radiation against a radiation "reference." The difference represents only the absorption of the selected gas compound. A differential thermopile . . . possibly the most accurate type of radiation detector . . . produces a proportional emf. An extremely sensitive Speedomax records the % concentration of the compound.

Here's why measurements are so stable! Voltage at the infrared source is regulated within 0.1% to assure a constant amount of transmitted radiation. Only one beam of radiation passes through the sample cell to minimize dispersion. Cells containing sensitizing gases are permanently sealed against leakage. Furthermore, the d-c thermopile provides inherently high stability.

Then, consider the flexibility of the L&N Analyzer! A turn of a dial is all that's needed to change ranges. One design of analyzer cell column handles all measurements. This design permits various lengths of cells to be used for maximum sensitivity. It's only necessary to slide a bracket and insert the desired sample or filter cell. The L&N equipment also offers flexibility of choice. It can be supplied calibrated or uncalibrated . . . for single or multiple-point recording . . . for electric or pneumatic control . . . with explosion-resistant or standard housings . . . with automatic or manual gas standardization.

Real measuring speed is still another feature! The thermopile responds immediately to all concentration changes. As a result, the L&N Analyzer first shows a change in only 3 seconds . . . records 90% of the change in 10 seconds.

The L&N Infrared Gas Analyzer is ready to go to work at your plant now. Send the coupon today for the kind of information you want.

Check These Ranges and Performance Facts!

PERFORMANCE DATA

In a typical application, the L&N Infrared Gas Analyzer is used to measure CO_2 in nitrogen. Here are the results obtained over the extremely narrow range of 0 to 0.08% CO_2.

Stability . . . . . $\pm 0.002\%$ CO_2
Sensitivity . . . . $\pm 0.0004\%$ CO_2
Readability . . . *Within 0.001%* CO_2

RANGES

The L&N Infrared Gas Analyzer can be calibrated for many different gas compounds and ranges. For purposes of illustration, however, the table below lists only the ranges available for the measurement of SO_2, CH_4, CO_2, or CO in nitrogen.

GAS	RANGES		
	Beginning at Zero		Where Range Starts Above Zero
	Minimum	Maximum	
SO_2	0 to 0.08%	0 to 10%	Span of at least 10%
CH_4	0 to 0.15%	0 to 10%	between 10% and 50%
CO_2	0 to 0.08%	0 to 5%	Span of at least 15%
CO	0 to 0.2%	0 to 8%	between 5% and 50%

LEEDS & NORTHRUP
4916 Stenton Ave., Phila. 44, Pa.

☐ Please send your data and specification sheets for the new L&N Infrared Gas Analyzer.

☐ I understand you have a pictorial demonstrator which shows clearly how the L&N Analyzer works and how it can be used for many different measurements. I would like to see this presentation.

Name_____

Title_____

Dept._____

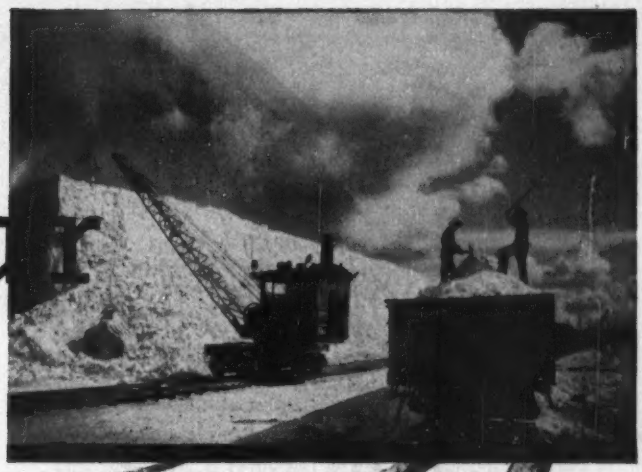
Company_____

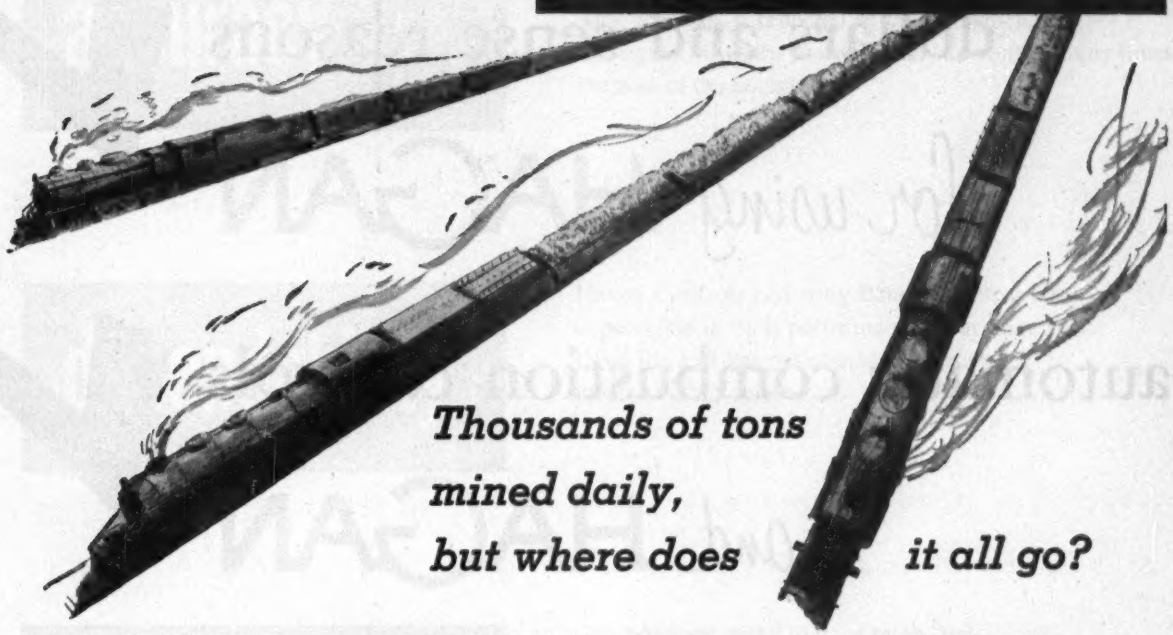
Address_____

Jrl. Ad ND46-91(2)

LEEDS & NORTHRUP
instruments automatic controls, furnaces

Sulphur





Thousands of tons mined daily, but where does it all go?

LOOK AROUND YOU and let your glance fall on any object. The chances are 1000 to 1 that sulphur played an important role in its manufacture, either as a component part of the finished product or as a processing element.

Take, for example, the very magazine you are reading. If it's average size it weighs about 1 pound. Made largely of sulphite pulp it required about 0.1 pounds of sulphur in its manufacture.

Multiply this 0.1 pounds of sulphur by the thousands of magazines turned out every day and you'll get some idea of the tremendous tonnage of sulphur required for this *single* division of industry . . . the sulphite pulp manufacture.

Sulphur has long been called One of the Four Pillars of Industry. Today's need emphasizes this fact more than ever. Sulphur producers are making every effort to get maximum production from existing mines and to develop new sources of sulphur as quickly as possible.

Texas Gulf Sulphur Co.

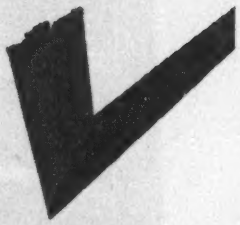
75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

check the

dollars and sense reasons

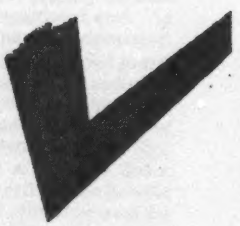
for using HAGAN



automatic combustion controls

and HAGAN

ring balance flow meters



HAGAN
HALL
BUROMIN
CALGON

It makes good sense to invest your dollars in Hagan Combustion Controls and Hagan Meters. The investment pays real dividends in the following ways:

accuracy

Hagan Automatic Controls and Ring Balance Meters are accurate, whether the system is simple or complex. This accuracy is reflected in savings which, during the life of the boiler, usually amount to many times the cost of the equipment.

dependability

Hagan Controls and Ring Balance Meters are dependable in their performance, year after year. Long life and low maintenance costs are inherent in all designs.

versatility

One boiler or many, one or more fuels, Hagan Controls handle the job easily. Hagan Ring Balance Flow Meters are the most versatile meters available for measuring and recording flow of liquids and gases.

Whatever your metering or combustion control problems, let Hagan Engineers help you solve them. Our experience is at your service. Write, or call us, at

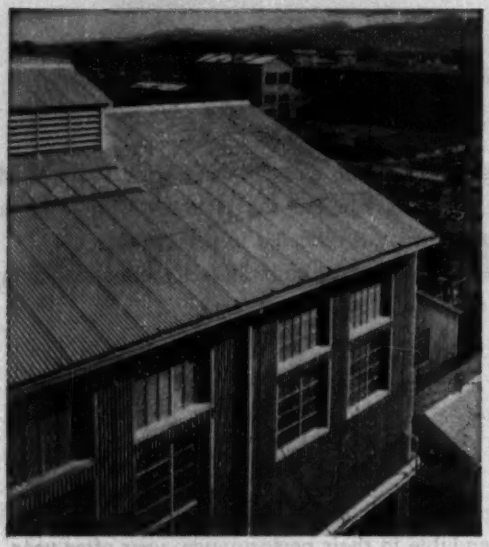
HAGAN CORPORATION

HAGAN BUILDING, PITTSBURGH 30, PA.

BOILER COMBUSTION CONTROL SYSTEMS
RING BALANCE FLOW AND PRESSURE INSTRUMENTS
METALLURGICAL FURNACE CONTROL SYSTEMS
CONTROL SYSTEMS FOR AUTOMOTIVE AND
AERONAUTICAL TESTING FACILITIES

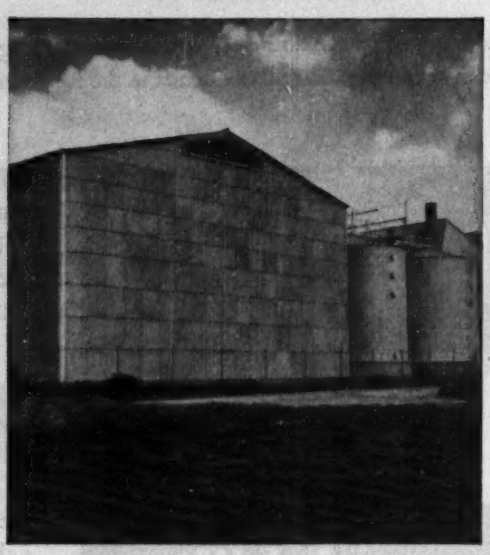
CORRUGATED *Asbestos* TRANSITE*

For Dependable Roofing



The Johns-Manville Corrugated Transite roof of this oil refinery building will give many years of dependable service, provide protection against fire, and will remain unaffected by the severest weather conditions.

For Economical Sidewalls



Used as siding for this recently completed building, Johns-Manville Corrugated Transite will provide years of durable service and fire safety wi h a minimum of care. It needs no paint or special treatment to preserve it.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proven an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof, needs no paint or special treatment to preserve it, and can be salvaged and re-used if necessary.

Today, Corrugated Asbestos Transite is also used increasingly for smart interiors . . . the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

• • •

Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. CE, New York 16, N. Y. In Canada write 199 Bay Street, Toronto, Ontario.

*Reg. U. S. Pat. Off.

EASY TO FASTEN TO STEEL

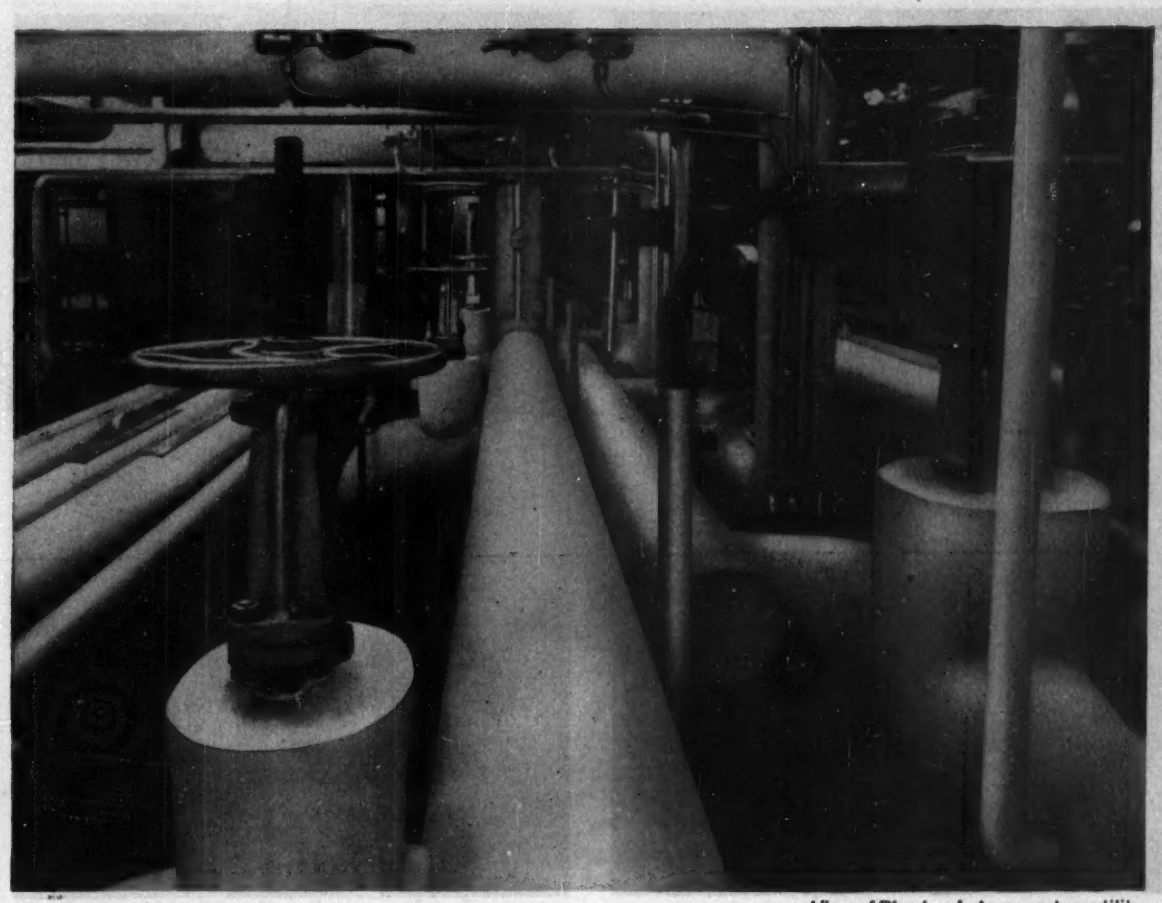
EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

JM

Johns-Manville *Asbestos* **CORRUGATED TRANSITE**



View of Pipe bay in large eastern utility plant, showing pipes insulated with K&M "Featherweight" 85% Magnesia.

FOR ECONOMY'S SAKE

Insulate with "Featherweight"

85% MAGNESIA

Save heat and you save money. Thousands of plants depend upon "Featherweight" 85% Magnesia to do just that. And no wonder!

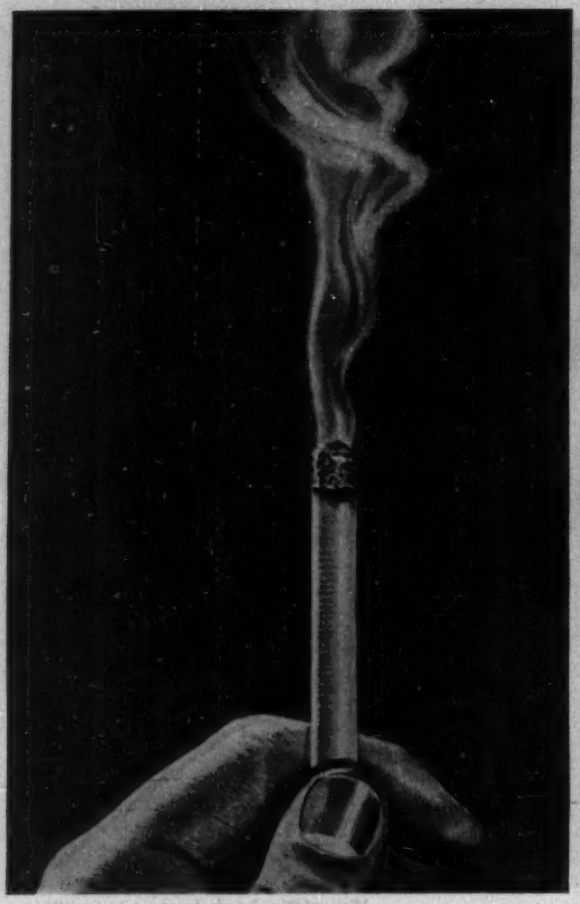
"Featherweight" needs no introduction to thousands of users, many of whom first experienced its unusual qualities before this century began.

It is a superb insulation, low in thermal conductivity and not only effective on heated surfaces with temperatures up to 600° F., but when used in combination with K&M Hy-Temp Insulation, it is efficient up to 1900° F. This combination of double layers permits staggering all joints and eliminating heat loss through open joints when expansion occurs.

Keep this heat-saving, money-saving insulation in mind for applications in *your* company's plants. It will serve you well—always! For detailed information on "Featherweight" 85% Magnesia, see your local K&M distributor, who is an experienced applicator, or write directly to us.

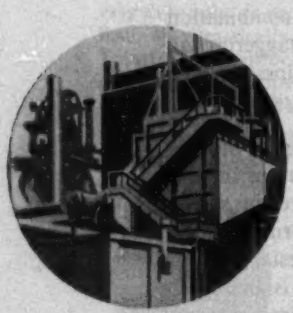
Nature made asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA



What do these two 'smokes' have in common?

THE SMOKE PARTICLES that cigarette filters attempt to trap are often as small as one 2 millionth of an inch.



Gases generated in industrial processes contain particles as minute as these—in addition to many a good deal larger. And, particularly in cases where a range of microscopic particles is involved, tests show Koppers-Elex Electrostatic Precipitators to be the most effective and efficient means of achieving these three benefits:

FIRST—recovery of valuable materials entrained in process gases.

SECOND—cleaning of gases for subsequent re-use.

THIRD—control of discharge gases well within the limits set by nuisance abatement laws—vital in maintaining good public relations in industrial communities.

Koppers precipitators can work at almost 100% efficiency . . . and operate *continuously*, too. Koppers multiple-chamber design permits the gas-cleaning operation to continue uninterrupted in one chamber while another is undergoing inspection or maintenance.

Koppers-Elex precipitators are designed, engineered, fabricated, erected, and guaranteed under one contract by the Koppers Company. For analysis and recommendations relating to your operation, submit details without obligation to: KOPPERS COMPANY, INC., *Precipitator Department*, 217 Scott Street, Baltimore 3, Maryland.

GUARANTEE: All Koppers-Elex precipitators are guaranteed to meet your specifications for efficiency or residual content.

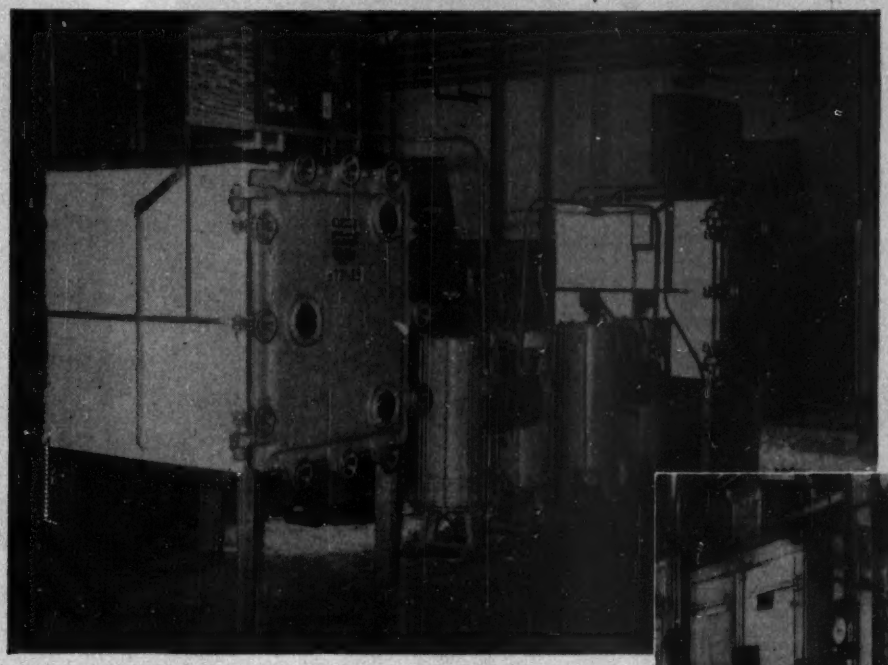
KOPPERS

ELECTROSTATIC PRECIPITATORS

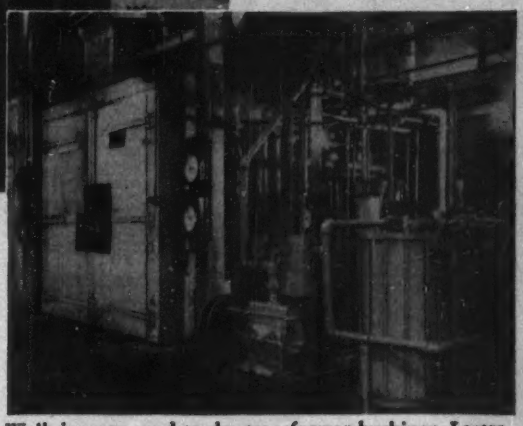
METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC., BALTIMORE 3, MD.

This Koppers Division also supplies industry with Fast's Couplings, American Hammered Industrial Piston and Sealing Rings, Aeromaster Fans, Gas Apparatus.

Engineered Products Sold with *Service*



DRY air breaks the vacuum in these ovens, flushes out unwanted moisture, then is sealed into automatic control parts. Such dryness eliminates any possibility of internal corrosion.



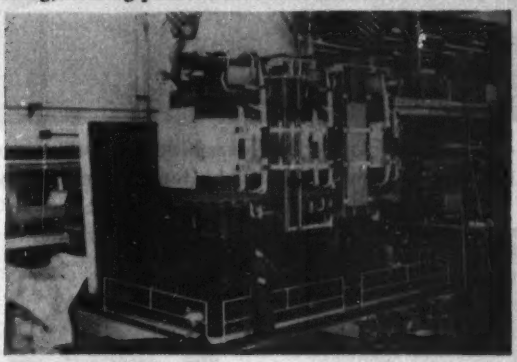
Walk-in oven used to dry transformer bushings. Lectrodryer processed air flushes through the bushings prior to filling, assuring perfect freedom from unwanted moisture.

Get Rid of UNWANTED MOISTURE!

WITH LECTRODRYERS*...

Small space or large . . . from vacuum ovens to walk-in ovens to huge workrooms . . . there are Lectrodryers to supply DRY air continuously, automatically, economically. Drying work areas to 10% relative humidity is not uncommon.

Our engineers have solved hundreds of moisture problems for manufacturers. Their experience may help you. Write: Pittsburgh Lectrodryer Corporation, 303 32nd Street, Pittsburgh 30, Pennsylvania.



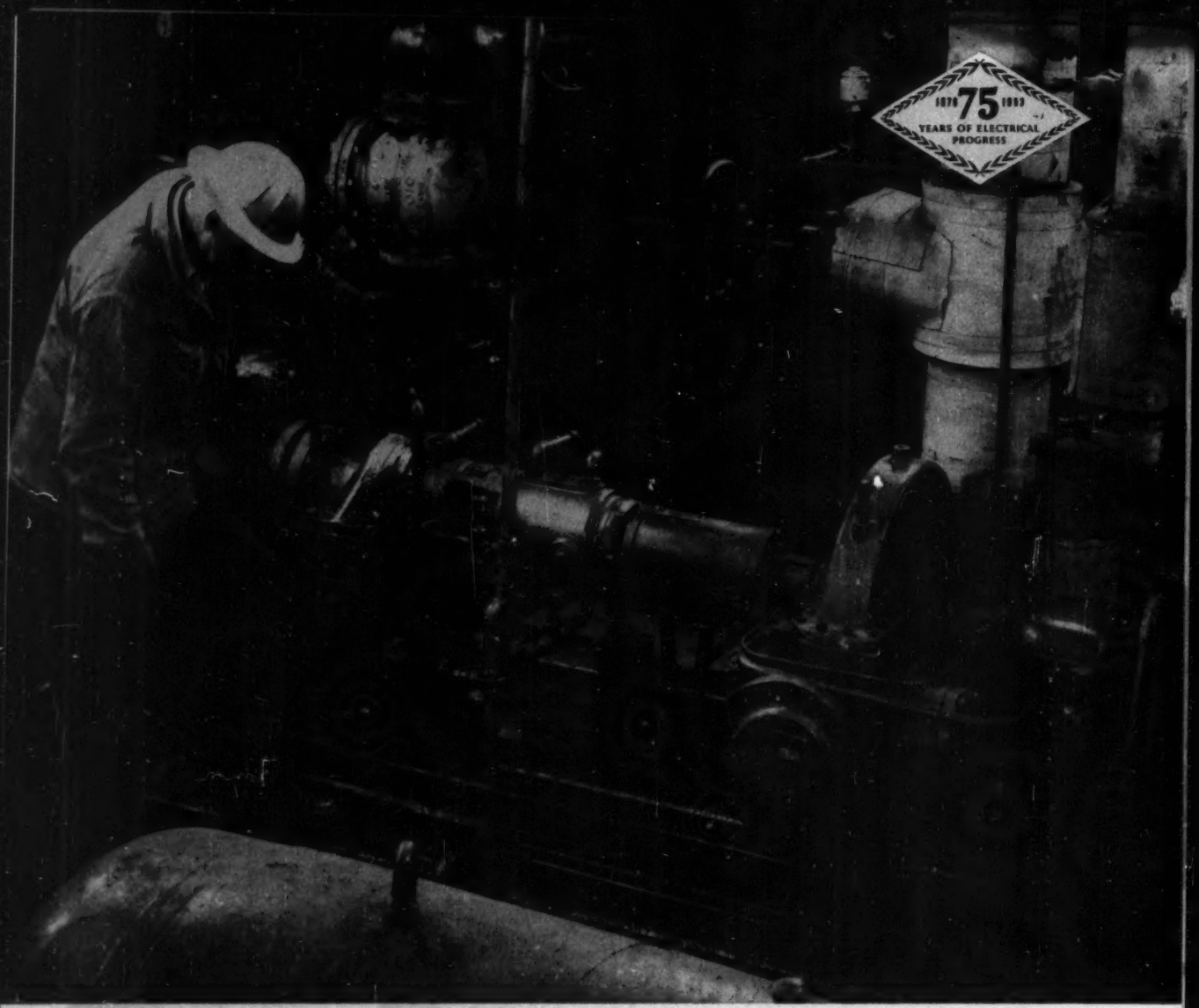
When the door is closed, the tank will be flooded with heated, DRY air. All unwanted moisture is evacuated, then immediately the transformer is transferred to its own container and sealed. This assures maximum insulation quality. Lectrodryer, of course, supplies the required DRY air.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
In Belgium: S. A. Belge Stein et Roubaix, 320 Rue du Moulin, Bressoux-Liege

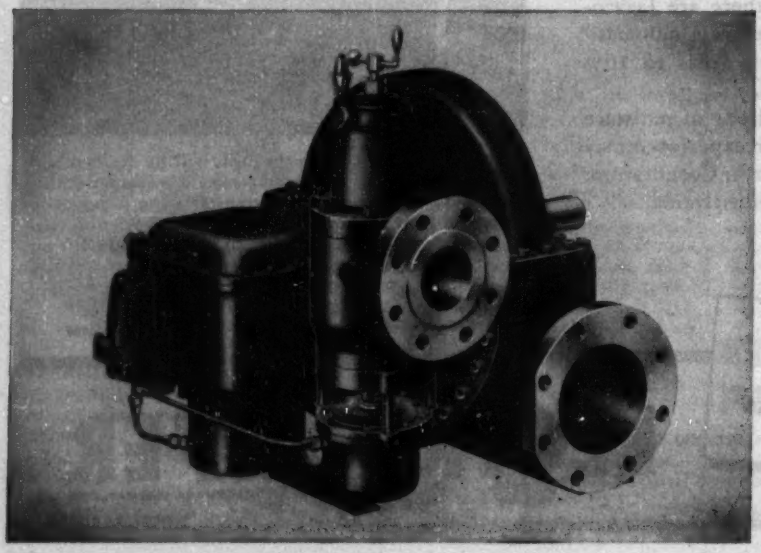
LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

* REGISTERED TRADEMARK U. S. PAT. OFF.



Mr. A. Bourgeois, process foreman at Sohio Refinery, adjusts pump valve. Type DP-20, 125 hp turbine increased by 75% the oil thru-put of this pump which supplies crude oil for the distillation unit.



Type DP MECHANICAL-DRIVE TURBINE

This Type DP turbine is one of General Electric's line of mechanical-drive turbines designed for driving pumps, compressors, blowers, etc. Their sturdy construction and many safety features make them ideal for industries having process steam requirements.

At Sohio's Toledo Refinery, this 15 hp, Type DP-16 turbine with non-sparking enclosed overspeed governor, safely pumps propane in an explosive atmosphere.

Mr. Eugene Ten Eyck and Mr. E. J. Bissonnette of Sohio Refinery discuss stocking of interchangeable parts for the Type DP turbines installed at the Refinery.

Sohio Refinery picks G-E turbine drives to increase oil thru-put

Engineers at Sohio's Toledo Refinery installed two G-E mechanical-drive turbines to help eliminate a bottleneck in refinery operations. A General Electric Type DP-20 turbine increased oil thru-put on one pump at Sohio by 75%, when it replaced older drive equipment. Total daily thru-put of the one pump now equals the former capacity of two pumps.

INSTALLED IN HAZARDOUS AREA

Sohio also installed a G-E Type DP-16 turbine in an explosive atmosphere to pump almost pure propane. The enclosed, non-sparking overspeed governor and the positive trip-throttle valve (which shut off all steam flow in case of overspeed) reduce hazards in this area. The turbine, which operates twenty-four hours per day, has required no maintenance during its first year of service.

VIBRATION REDUCED

Replacement of previous drive equipment with a G-E turbine now assures longer life to other machinery in the area. For G-E turbines with their center-line support and rigid assembly of buckets are now contributing to smooth operation at the refinery.

INTERCHANGEABLE PARTS

Use of G-E standard turbines can make stocking of spare parts a simple matter—most replacement parts are interchangeable among various frame sizes of G-E Type DP turbines. Stocking costs are cut, yet parts are available when needed.

This same parts standardization adds to the turbine's flexibility—often the turbine can be adapted to a new plant application with only minor adjustments. Horsepower range can be changed by substituting a different nozzle plate and valve parts.

For more information about the many advantages which these standardized turbines offer, call in your G-E sales-engineer or write for bulletin GEA-4955A, "A New Standard in Mechanical-drive Turbines." Section 252-56, General Electric Company, Schenectady 5, New York.

GENERAL ELECTRIC

EPPENBACH EQUIPMENT

MIXING AND HOMOGENIZING EQUIPMENT FOR VACUUM OR PRESSURE OPERATION WITH THE

EPPENBACH "AGI MIXER"

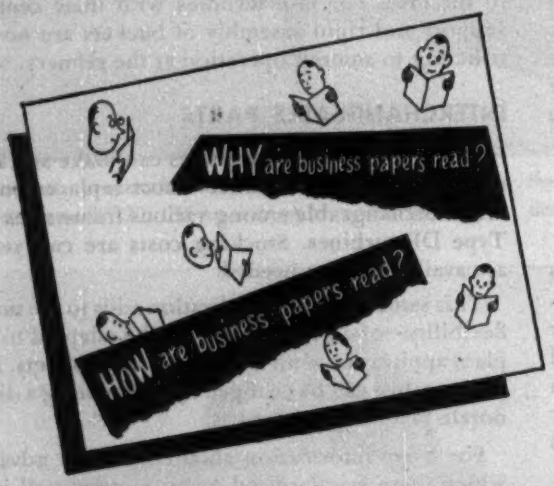
Affording advantages of paddle mixing and high speed homogenizing in one compact installation.

The "Agi" mixer produces uniform, finely homogenized blends in a fraction of the time required by conventional mixers because it combines all the desirable features of horizontally rotating, double motion paddles fitted with scraper blades with the Eppenbach high speed, high shear Homo-Mixer. The Agi mixer is designed so that the paddles may be operated either separately from, or in conjunction with the Homo-Mixer—the complete mixing assembly being installed in a jacketed kettle which can be operated atmospherically, under vacuum, or under pressure. The unit is adaptable to any required set of processing conditions and furnished complete for immediate operation. *Write for Circular 403 and additional information.*

MANUFACTURED IN ANY STYLE OR SIZE TO FIT YOUR REQUIREMENTS

ADMIRAL TOOL & DIE CO., INC.

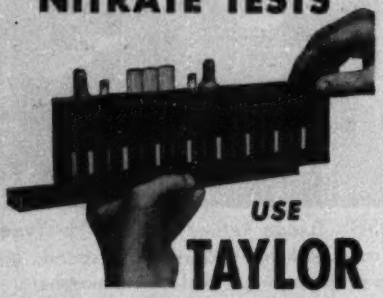
45-10 VERNON BLVD., LONG ISLAND CITY 1, NEW YORK



A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet."

McGraw-Hill Publishing Company, Room 2710, 330 West 42nd St., New York 36, N. Y.

How to make ACCURATE pH, CHLORINE, PHOSPHATE, NITRATE TESTS



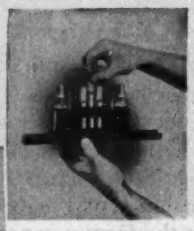
USE

TAYLOR COMPARATORS

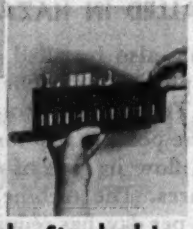
You can make many determinations in seconds . . . longest take only two minutes. Taylor Sets are lightweight, easy to carry for on-the-spot tests, or you can use them in the lab. Each set complete with accessories and reagents.

Easy as **A • B • C**

A. Fill three test tubes with sample to be tested and place them in the base.



B. Add reagent to middle tube only.



C. Place color slide on base, move across until colors match, and . . . THERE'S THE VALUE!

Guaranteed Color Standards!

Sealed-in-plastic color standards carry an unconditional guarantee against fading that gives you complete freedom from mechanical inaccuracy in making determinations. No single standards to handle. Each slide contains a complete set of standards for any one determination.

SEE YOUR DEALER . . . for equipment. Write direct for FREE HANDBOOK on pH and Chlorine control in 34 basic industries. Also illustrates and describes all Taylor Sets.

W. A. TAYLOR AND CO.
414 RODGERS FORGE RD • BALTIMORE, MD

Dr. Swan's baby swathes a nation

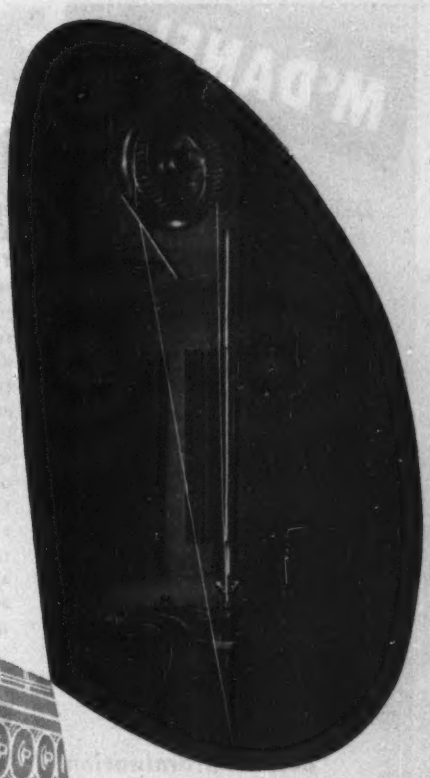


Photo courtesy of American Viscose Corporation

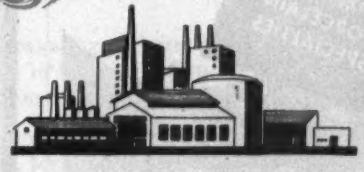
Better than that, rayon and other synthetic fibres are rapidly clothing the entire world . . . sparking a new "industrial revolution". And the man who started it all . . . the man who first beat the silkworm at its own job, was an Englishman, Joseph Wilson Swan.

Yes, Joe Swan, in 1883, created the first synthetic filament which he called "artificial silk". (Although Chardonnet actually gave us our first commercially successful process, Swan was historically the first to make a synthetic filament. And just to keep it in the family, his daughter crocheted a few threads into doilies and so became the first rayon converter.)

But for all its potential superiority, rayon wasn't an instant success. Even Topham's discovery of the glass spinnerette didn't lessen the desirability of the "natural" product. No, it wasn't until platinum spinnerettes were substituted for glass that the synthetic fibre industry began to germinate, take root and grow with all the vigor of a tropical plant.

Bishop is proud of its contributions to the field of synthetic fibres. Besides contributing its research (Bishop was the first American company to make spinnerettes), for about 20 years Bishop was the only supplier of precious metals for the seemingly boundless appetite of the synthetic industry.

Yes, platinum has fulfilled an important part in the development of synthetic fibres, as well as myriad other great industrial achievements. And since 1842, almost 80 years before anyone else even thought of refining and fabricating platinum, Bishop has been busily contributing precious metal research and "know-how" to science and industry. So why not borrow from this wealth of 111 years experience? Specify Bishop on your next precious metals requirement.



Quality Leadership Is Tested By Time
No. 1 of a series

J. BISHOP & CO. • Platinum Works

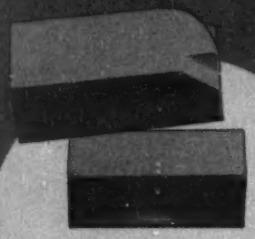
In our second century serving Science and Industry

Malvern Penna.

McDANEL

HIGH DENSITY PORCELAIN

- MILL LINING
- SPECIAL SHAPES
- TANK LINING



For Hard-Tough Grinding Longer Wear Less Contamination and Greater Savings In Money

McDanel Super High Density Lining Brick, in actual grinding, is boosting production, cutting re-lining in half, and reducing replacement costs.

For top performance and economy, specify McDanel High Density brick on your next mill lining order. Complete range of sizes to fit all types of batch and continuous mills.

Write for "McDanel Industrial Porcelains" catalog.

HIGH TEMPERATURE PORCELAIN SPECIALTIES

McDANEL

REFRACTORY PORCELAIN CO.

BEAVER FALLS, PENNSYLVANIA

Dump it in their Lap!

THESE NAGLE PUMP SALES ENGINEERS ARE QUALIFIED TO HELP SOLVE YOUR PUMP PROBLEMS!

FREDERICK PUMP & ENGINEERING CO.
5743 Duarte St., Los Angeles 38, Calif.
COOPER ENGINEERING CO.
1639 Russ Bldg., San Francisco, Calif.
THE MINE & SMELTER SUPPLY CO.
1682-1696 Blake St., Denver 2, Colo.
W. D. TAULMAN & ASSOCIATES
452 Spring St., N.W. Atlanta, Ga.
THOMAS PUMP CO., INC.
37 West Van Buren St., Chicago 5, Ill.
ROUSSEL PUMP & ELECTRIC CO.
P. O. Box 9206, New Orleans, La.
HAYES PUMP & MACHINERY CO.
100 Vine Street, Somerville 43, Mass.
WM. A. DaLEE, INC.
9100 Rosetawn Ave., Detroit, Mich.
C. T. DeHAAS COMPANY
Kaufman Building, Marquette, Michigan
F. H. BATHKE
400 N. Snelling Ave., St. Paul 4, Minn.
ENGINEERING & EQUIPMENT CO.
406 Market St., St. Louis, Mo.
JOHN REINER & CO.
36-50 38th St., Long Island City, New York
AMERICAN BRAKE SHOE COMPANY
Expert Division, 230 Park Ave., New York 17, N. Y.
BIEWERT EQUIPMENT CO.
20 Eastland Ave., Rochester 15, New York
JORDAN ENGINEERING COMPANY
Roselawn Center Building, Cincinnati 37, Ohio
GEORGE P. SCHUMACKER CO.
1120 Chester Ave., Cleveland 14, Ohio
C. S. CARTER
920 World Bldg., Tulsa 3, Okla.
BYRON DUNKLEY
Commercial Trust Bldg., Philadelphia 2, Penna.
PITTSBURGH GAGE & SUPPLY CO.
P. O. Box 1168, Pittsburgh 30, Pa.
RAMSAY PUMP & SUPPLY COMPANY
1701 Keenan Building, Pittsburgh 22, Pa.
THE MINE & SMELTER SUPPLY CO.
410 San Francisco Ave., El Paso, Texas
MODERN ENGINEERING SALES
7401 Avenue N—Box 9234, Houston 11, Texas
THE MINE & SMELTER SUPPLY CO.
121 W. Second South St., Salt Lake City, Utah
FRANK HOWELL CO.
P. O. Box 36, Richmond 1, Va.
GENERAL MACHINERY COMPANY
P. O. Station B, Spokane, Washington
CROSS PUMP & EQUIPMENT COMPANY
Box 889, Charleston, West Virginia
MINERT PUMP & ENGINEERING CO.
4321 W. Center St., Milwaukee 10, Wis.

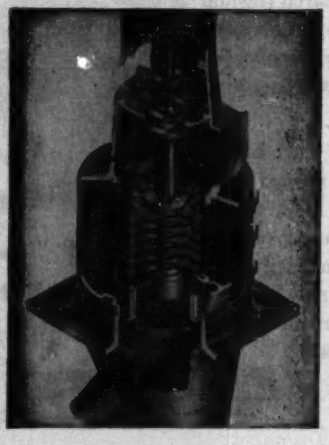
NAGLE PUMPS

NAGLE PUMPS, INC.

1235 CENTER AVENUE, CHICAGO HEIGHTS, ILLINOIS

PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

CASE HISTORY SERIES



ASBESTOS PLANT FIBERIZES SCRAP WITHOUT INJURY TO FIBERS

Wet asbestos board scrap is reduced to a pulp at 3% consistency, for immediate re-use in the processing line. One RD-18 Rietz Disintegrator with 40 HP achieves capacities to 7200 lbs. per hour in this plant. This is typical of many such services using the unique ability of the Rietz Disintegrator to fiberize pulp without damage to the fiber lengths.

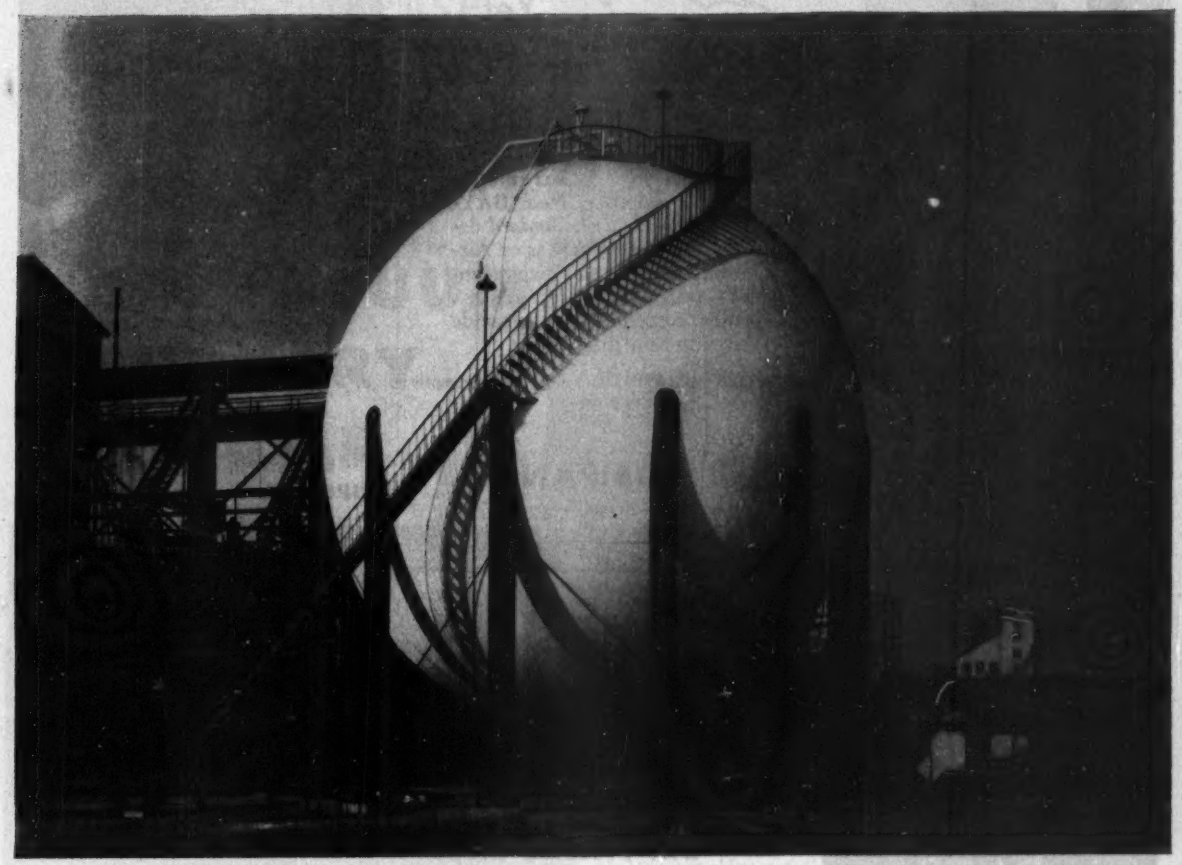
Write for free technical literature. Let us quote you on size reduction equipment to solve your particular processing problem.

Equipment for the food and chemical process industries

Rietz MANUFACTURING CO.

Santa Rosa, California

this DISTINCTIVE HORTONSPHERE*



stores Anhydrous Ammonia

. . . for the Spencer Chemical Company at Henderson, Kentucky. It has a capacity of 15,000-bbls., is 54 ft. 9 in. in diam. and designed for a working pressure of 75 lbs. per sq. in. The pressure in the Hortonsphere is maintained below the setting of the pressure release valve by compressing and recondensing the vaporized ammonia and pumping the liquid back into the Hortonsphere.

There is a Horton tank built to fit most storage requirements of the chemical industry. Our engineering, fabricating and erection departments are experienced in building structures of carbon steel and corrosion-resistant metals.

Hortonspheres are available in capacities up to 30,000 bbls. for pressures up to 217 lbs. per sq. in. in the smaller capacities. Write our nearest office for further information, estimates or quotations on the Hortonsphere or any other Horton steel plate structure. There is no obligation on your part.

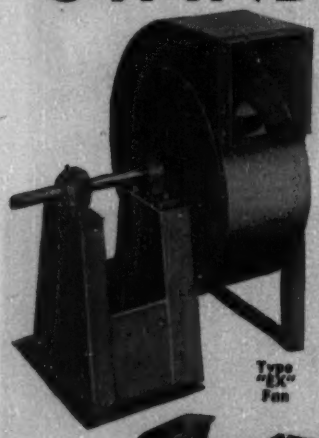
Trade Mark Registered in U. S. Patent Office

CHICAGO BRIDGE & IRON COMPANY

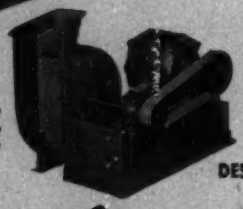
Atlanta 3.....2120 Healey Bldg.
Birmingham 1.....1510 North Fiftieth St.
Boston 10.....1005-201 Devonshire St.
Chicago 4.....2124 McCormick Bldg.
Cleveland 15.....2220 Midland Bldg.
Detroit 26.....1503 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston 2.....2103 C & I Bldg.
Los Angeles 17..1505 General Petroleum Bldg.
New York 6.....3319—165 Broadway Bldg.
Philadelphia 3...1625—1700 Walnut St. Bldg.
Pittsburgh 19.....Alcoa Bldg.
San Francisco 4.....1522—200 Bush St.
Seattle 1.....1305 Henry Bldg.
Tulsa 3.....1623 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

"STANDARD" With Bayley Yet "SPECIAL" For YOU!



Type "K" Fan



Type "H" Blower For High Pressure Use

FANS built precisely right for your exhaust ventilation or pneumatic conveying requirements await your selection from BAYLEY'S wide range of *standard* designs. . . . Wheels for Gas or Air-Handling—spark and explosion-proof—sealed housings. . . . Sturdily constructed to provide years of dependable service.

DESCRIPTIVE BULLETINS and Data sent promptly upon your request

Bayley BLOWER COMPANY
Engineered Air-Handling Equipment

1823 S. 66th St.—Milwaukee 14, Wis.

BASKET TYPE

STRAINERS

- Large Strainer Area!
- Low Pressure Drop!
- Easily Cleaned!

Davis Basket Type Strainers are used on pressure and suction pipe lines for the protection of meters, valves, pumps and other equipment. The No. 76 Strainer has a cylindrical basket with perforated sides and bottom supported at the top by a flange. When the cover is removed the basket may be lifted out easily for cleaning. Large body passage reduces pressure drop across the strainer to a minimum. The size of screen perforations depends on the fluid being strained and the foreign matter in suspension. Ask for recommendations.

DAVIS No. 76 STRAINER SIZES ½" to 14"

Davis

2539 SOUTH WASHTENAW CHICAGO 8, ILLINOIS

---

for HEAT or PROCESS

Economical, and highly efficient, **SUPERIOR Steam Generators** arrive at your plant ready to produce steam for process or heat. Completely factory assembled and tested, they are backed by undivided responsibility.

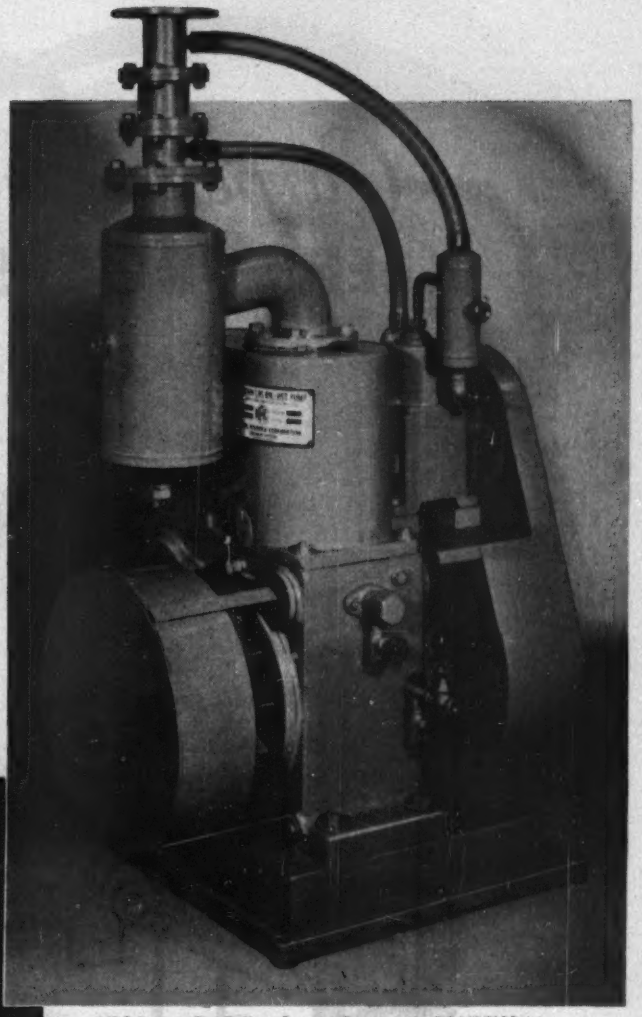
- Fully automatic burning oil or gas or both in combination.
- Mounted on rigid channel iron base, they require no special foundation.
- Built-in induced draft eliminates the need of an expensive chimney.
- Simple installation permits a nearby source of process steam.
- Battery installation provides extreme flexibility for varying steam demands.
- Special units for permanent outdoor installation.
- Fire-Tube models in 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i. Write for catalog 522-F.
- Water-Tube models in 9 sizes from 200 to 1,000 b.h.p. for pressures up to 400 p.s.i. Higher pressures on special order. Write for catalog 522-W.

for performance you can **BANK** *on*

SUPERIOR STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

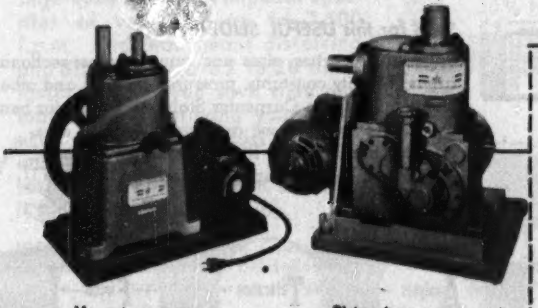
Water Vapor Won't Condense in this NEW HIGH VACUUM ROTARY PUMP



NRC Rotary Gas Ballast 2-stage Pump — Model NRC100M

- Maintains initial cfm rate when pumping water vapor
- Eliminates oil reclaiming unit
- Greater capacity under 1 mm Hg
- Up to 80% less oil charge
- Capacities from 1¼ cfm to 400 cfm
- Pressures down to 10^{-4} mm Hg

The new NRC Rotary Gas Ballast Pump actually *prevents* water vapor from condensing, and contaminating the pump oil. Therefore, unlike all other type rotary vacuum pumps, fast pump down time is maintained when pumping condensable vapors. This is important news wh[illegible] vacuum is used.



Vane-type pump Model NRC6S

Piston-type pump Model NRC30S

NRC Rotary Gas Ballast Pumps are available in capacities from 1¼ cfm to 400 cfm; pressures down to 10^{-4} mm Hg; a full line of vane, piston-type and 2-stage pumps.

Send coupon today, for your copy of the new bulletin that gives a full explanation of the Gas Ballast principle, and complete engineering data on the construction and operation of the NRC Rotary Gas Ballast Pump.

NRC National Research Corporation

EQUIPMENT DIVISION, *70 Memorial Drive, Cambridge, Mass.*

Send me more facts about the NRC Rotary Gas Ballast Pump ☐ Have your Salesman call ☐

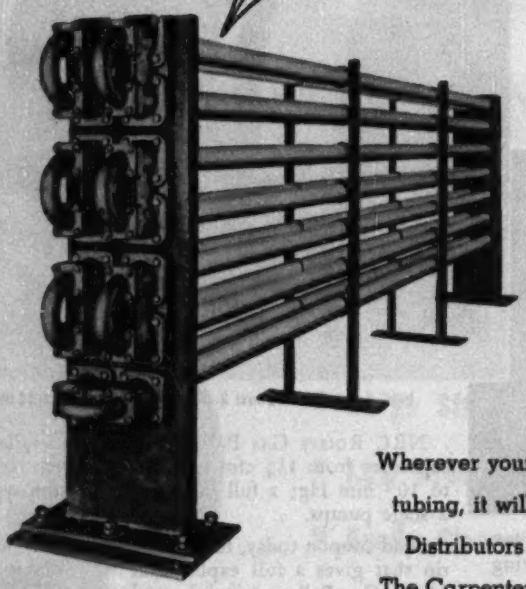
Name _____

Title _____

Company _____

Address _____

Carpenter Stainless Tubing KEEPS PROCESSES GOING ON SCHEDULE



Modern heat transfer equipment has to stay on the job. You can't afford to interrupt a process for hours or days to replace tubes.

That's why the manufacturer of these units selected Carpenter Stainless Tubing, Type 316. In addition to providing good corrosion resistance, Carpenter tube quality and uniformity help to make the 20th unit as good as the first.

Wherever your processing equipment involves corrosion-resistant tubing, it will pay to put Carpenter experience to work for you. Distributors are located in principal cities from coast to coast.

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y. "CARSTEELCO"

Send for this USEFUL SLIDE CHART

Physical properties, sizes and gauges, cross-sectional areas, velocity constants, pressures, weights and other technical data on Carpenter Stainless Tubing for heat exchanger applications are condensed into this handy chart. It's yours for the asking, on your company letterhead.

Carpenter

STAINLESS TUBING & PIPE

- guaranteed on every shipment

same working space

but CAPACITY DOUBLED with a Cowles

Stymied by insufficient dissolving capacity? Then replace your present mixer with a Cowles Dissolver — it more than doubles your capacity in the same working space!

THE COWLES DISSOLVER is a high-speed unit. Its impeller operates at velocities up to 7,500 f.p.m. And that means dissolving and dispersing move 2 to 20 times faster — that you save time and labor while improving your product. It's rugged, fast-loading, easily maintained — performs tasks other mixers cannot because it's engineered to the job.

WRITE FOR CATALOG on Cowles Dissolvers! And ask to have a detailed test run on your materials — no obligation.

The Cowles Company
INCORPORATED
112 TRACKSIDE • CAYUGA, N. Y.

It's new . . . it's "NETONE" Filter Paper

- HIGH TENSILE STRENGTH
- HIGH BURST FACTOR
- ABRASION RESISTANT
- CREASE RESISTANT
- CHEMICAL RESISTANT

"NETONE" Filter Paper is a neoprene impregnated kraft paper that offers decided mechanical and chemical advantages over standard filter papers.

When compared to 60-pound unbleached kraft "NETONE" Filter Paper shows a 500% increase in wet tensile strength, wet burst factor increases from 6 to 57 and there is a marked increase in abrasion and crease resistance.

Write us about your requirements and we will be glad to send samples for your testing.

. . . And for your filter cloth requirements, we weave fabrics of VINCEL*, SARAN, DYNEL, NYLON, ORLON**, VINYON N†, and GLASS. Samples sent on request.

Solution	60-Pound Kraft	Wet Strength Resin	Neoprene Treated (3%)
H_2O	0	72 hr.	86 hr.
10% HCl	0	6 min.	4 hr.
10% NaOH	0	6 hr.	72 hr.

*TM —Nat'l Filter Media Corp.
**TM —E. I. duPont de Nemours Co.
†TM —Union Carbide & Chemical Co.

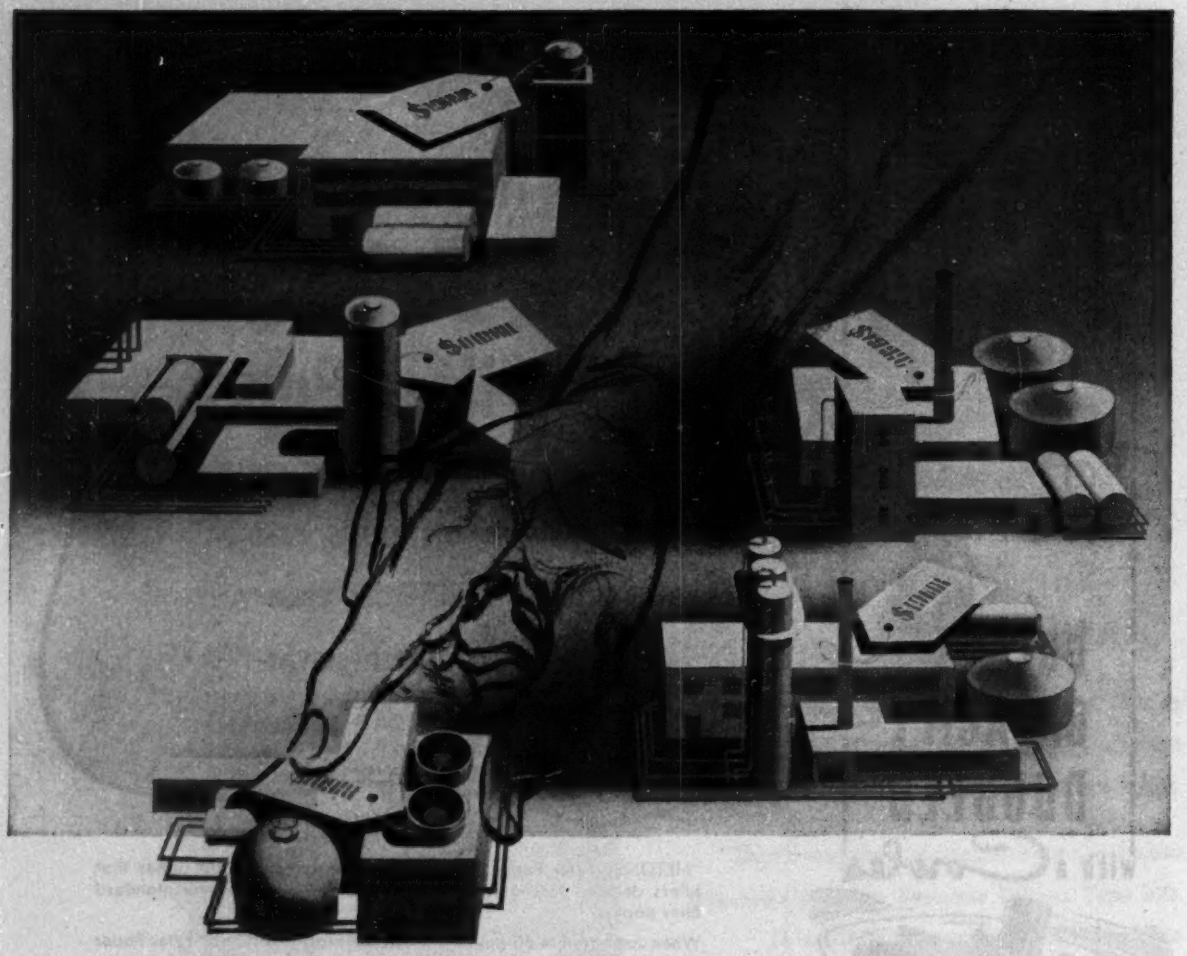
Weavers of Industrial Filter Media for over Forty Years

NFM The National Filter Media Corp.

General Offices & Mills: New Haven 14, Conn.
Western Office & Factory: Salt Lake City 1, Utah

Sales Offices—Representatives

Chicago, Ill.	Cincinnati, Ohio	Houston, Texas	Oslo, Norway	Johannesburg, South Africa
2627 West 19th St.	Roselawn Center Bldg.	1406 Second National Bank Bldg.	Nicolai Friis	Edward L. Bateman



How to Shop for Extra Productivity

If you feel the output of your plant could be increased, you may be interested in what a company we know did. Their *process* probably differs from yours. But the way the problem was approached applies.

This company wanted economical drying of sodium chloride from a moisture content of 5% down to .01%. Protection of product purity was a must. The answer, in their case, was three continuous-flow, rotary-type driers of nickel-clad steel with solid nickel baffles. The driers are internally heated to 320° C. by four burners using natural gas. Ring gears rotating the drums are spring-mounted to relieve load and wear on teeth. Nickel working surfaces and parts protect the product from metallic contamination, and the equipment from corrosion and abrasion.

Rapid, economical drying resulted—60 tons of salt per drier per 22-hour day. Seeing this performance, this company ordered a battery of three more driers to bring its total to six.

Can more dollars be squeezed out of your throughputs? This company did it through combined planning by the engineering staffs of progressive Equipment Builders, process engineers, designers and materials suppliers. Such builders turn to Lukens regularly for its knowledge of materials and its wide range of low-cost clad steels.

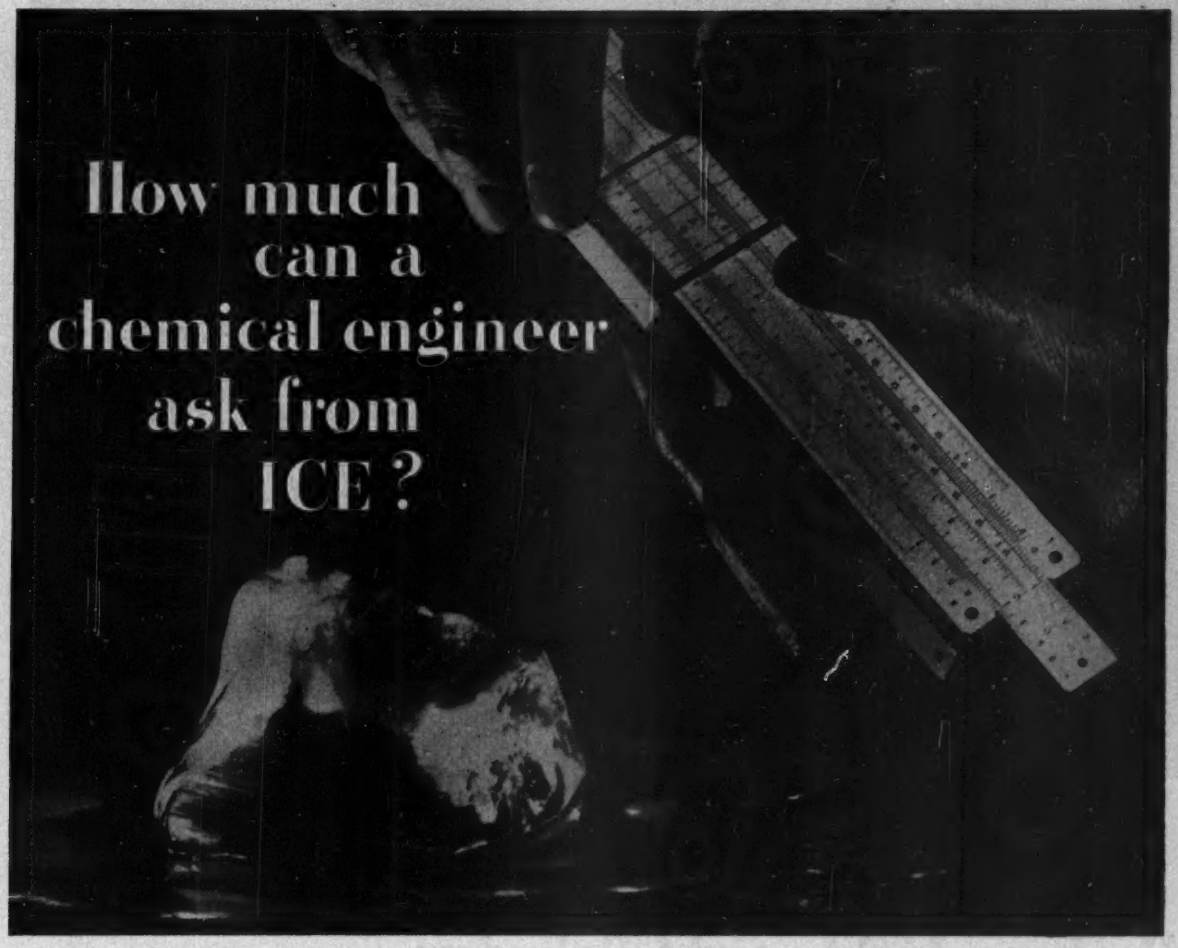
Even with new equipment hard to get, these builders can often recondition what you have for better, more profitable use. Would you like their names? Write us today explaining your need. Manager, Marketing Service, 400 Lukens Bldg., Coatesville, Pa.

LUKENS

World's Leading Producer of

SPECIALTY STEEL PLATE · PLATE SHAPES · HEADS · CLAD STEELS

LUKENS STEEL COMPANY, COATESVILLE, PA.



A YORK-FLAKICE AUTOMATIC ICEMAKER MEETS EXACTING DEMANDS WITH...

Ice *SO ECONOMICAL* . . . chemical companies can enjoy savings up to 80%!

Ice *SO PURE* . . . it doesn't unbalance precise chemical blends.

Ice *SO FRAGILE* . . . it prevents damage to delicate mixing machinery and chemical equipment.

Ice *SO COLD* . . . it provides one-third more refrigeration for chemical processes than crushed block ice!

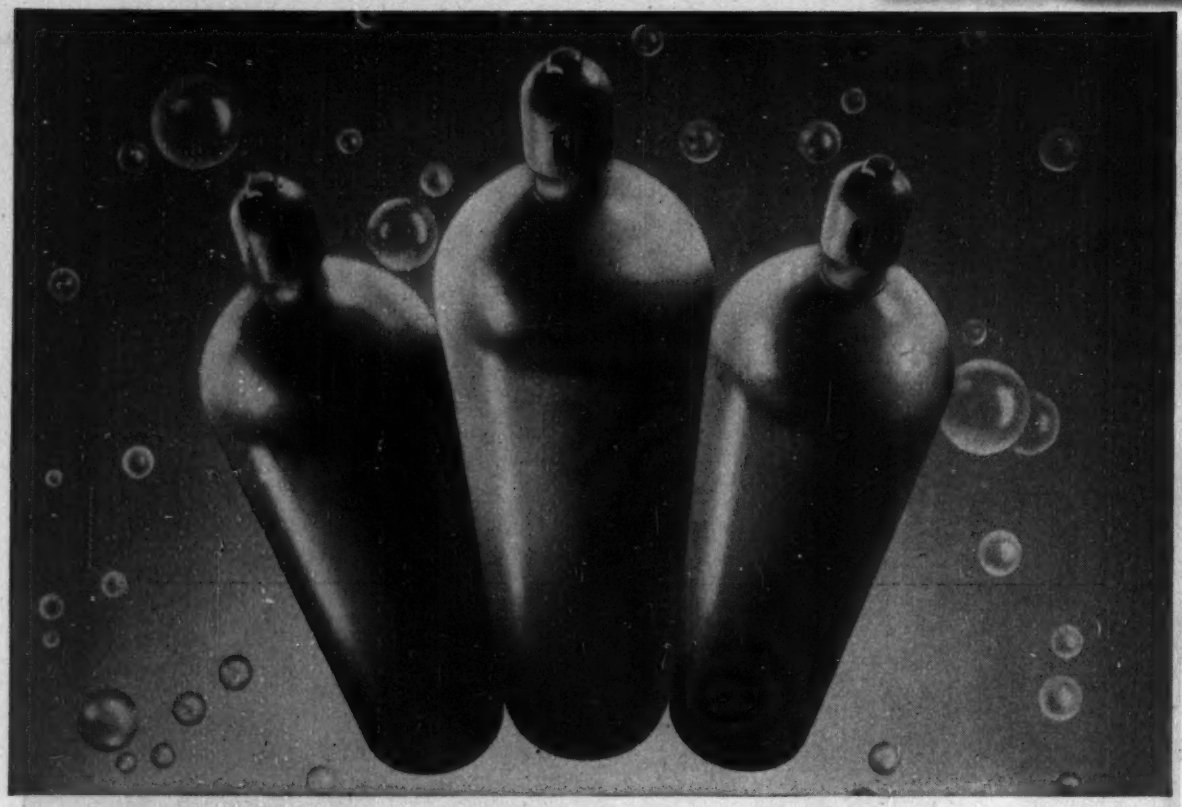
Ice *SO AMPLE* . . . a single machine can produce more than a ton an hour!

MODEL AP-1909

Unusual applications of York Ice Makers in the chemical field and other industries demonstrate York's creative engineering. The York District Office nearest you will gladly show you case histories pertinent to your needs—whether they be for 300 lbs. to 30 tons of ice per day. Or write directly to York Corporation, York, Pa., for information.

YORK REFRIGERATION AND AIR CONDITIONING
HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

York refrigeration air conditioning



SHIP 'EM FULL...OR SHIP 'EM EMPTY...

Hackney Lightweight Cylinders

SAVE YOU PLENTY!

There's no excess weight in a shipment of Hackney Seamless Compressed Gas Cylinders—no waste freight charges out *or* back.

For one reason—selected, high-quality steels assure adequate strength and light weight. For another—the Hackney process of cold drawing results in a uniform sidewall thickness that eliminates excess material.

MADE FOR THE SAFE TRANSPORTATION AND STORAGE OF MANY GASES—Hackney cylinders are convenient to handle... easy to fill and empty. They resist transportation and handling abuse ...*more than meet* all ICC regulations.

Write for complete information on the many types and sizes available.

Hackney

Pressed Steel Tank Company

Manufacturer of Hackney Products

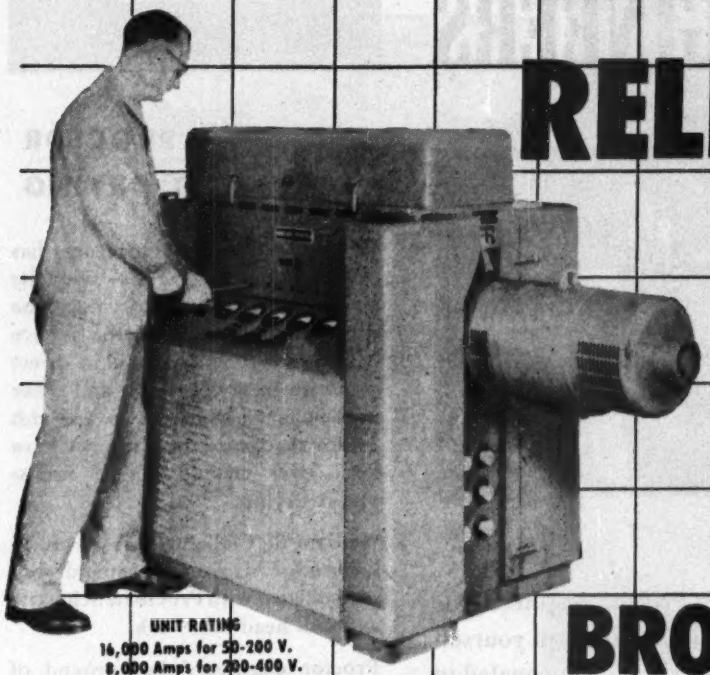
1447 S. 66th St., Milwaukee 14 • 1325 Vanderbilt Concourse Bldg., New York 17
203 Henna Bldg., Cleveland 15 • 936 W. Peachtree St., N.W., Room 113, Atlanta 3
208 S. LaSalle St., Room 792, Chicago 4 • 553 Roosevelt Bldg., Los Angeles 17
18 W. 43rd St., Room 15, Kansas City 11, Mo.

CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

10 years of operating experience

means

RELIABILITY



UNIT RATING
16,000 Amps for 50-200 V.
8,000 Amps for 200-400 V.

obtainable only with the

BROWN BOVERI MECHANICAL RECTIFIER

- ***The ELECTRO-CHEMICAL INDUSTRY*** can now have the benefits of UNPRECEDENTED EFFICIENCY, LOWER POWER BILLS and TROUBLE FREE OPERATION.
- NO MAINTENANCE, NO REPLACEMENT OF CONTACTS with unity load factor at D.C. Voltages up to 400 Volts.
- STABILITY and LONG LIFE EXPECTANCY OF CONTACTS made possible by:
  1-The use of proper alloys.
  2-The exclusive Brown Boveri Thyratron shunt circuit which KEEPS THE COMMUTATION CURRENT EXTREMELY LOW and provides for a LOW RATE OF RISE OF VOLTAGE across the break DURING COMMUTATION.
- IMMEDIATE RESUMPTION OF SERVICE AFTER ARC-BACK due to disturbances in the A.C. supply system. A super-fast contactor (1/10 of one cycle) protects the contacts and can be RESET AUTOMATICALLY an indefinite number of times without maintenance.
- AUTOMATIC ONLOAD VOLTAGE REGULATION within very wide limits.
- A QUICK, SELF-LIQUIDATING INVESTMENT because of the POWER SAVINGS IT MAKES POSSIBLE.

It will pay you to investigate this BROWN BOVERI Mechanical Rectifier.

FOR COMPLETE DATA, MAIL COUPON TODAY!

Brown Boveri Corp., 19 Rector St., N. Y. 6
Please send me data on Mechanical Rectifiers.
Name.....Title.....
Company.....
Address.....
.....

BROWN BOVERI

BROWN BOVERI CORPORATION
19 RECTOR STREET, NEW YORK 6, N. Y.

For Precision Processing Equipment call PROCTOR ENGINEERS

You're on the right line when you call Proctor engineers for precision processing equipment. By so doing you avail yourself a breadth and depth of experience that is virtually unequaled in in any other single equipment manufacturer.

The result—carefully designed, well built equipment that will meet *precisely* the need for which it is created.

Proctor project engineered equipment is operating today in all branches of the process industries—heavy chemicals, pharmaceuticals, food, leather, tanning, synthetic textiles, rubber manufacturing, plastics and many more.

With their wide range of experience in building individually designed drying and fiber processing machinery—Proctor engineers are well equipped to apply their skill to developing, engineering and manufacturing *other processing machinery.* This machinery may be related to drying equipment and used in the same range—or it may be totally unrelated but require the same basic kind of engineering and manufacturing skill.

Call Proctor engineers—it is the shortest way to the surest solution to your processing equipment problem.

PROCTOR CREATIVE ENGINEERS AT WORK

NOW IT'S PROCTOR FOR SPRAY DRYING

Proctor creative engineering has broadened its horizons—with its entrance into spray drying. The decision to extend Proctor service to include spray drying is in direct response from customers and other manufacturers who have worked with us—or recognize the work we have done over many years in atmospheric drying.

William M. Clelland, who is widely known for his work in spray drying is associated with Proctor & Schwartz and will head this work.

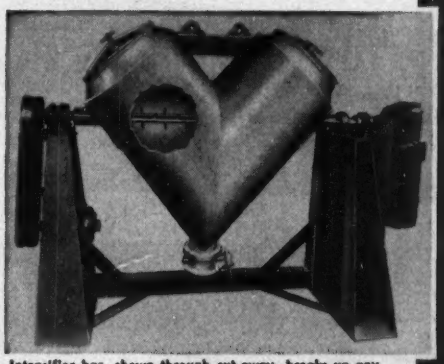
Proctor engineers' background of association with the process industries—combined with Mr. Clelland's experience make this move a natural one.

Proctor & Schwartz offers this advantage over any other manufacturer of spray drying equipment . . . they know and have worked with atmospheric drying and Infra-red freeze drying, so that if the requirements of your product indicate any one of these processes—we are fully equipped to serve your best interests.

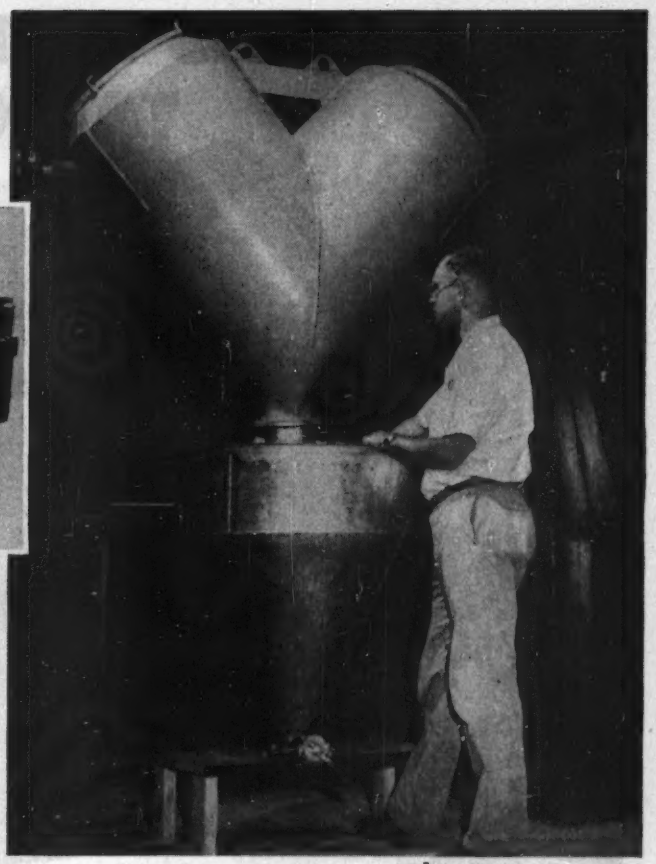
Proctor engineers are ready, willing and able to discuss your drying requirements, study your product and make intelligent recommendations.

Let us hear from you as soon as you know that your product must be dried. Early consideration will result in substantial savings.

PROCTOR & SCHWARTZ, INC.
7111 Tabor Road • Philadelphia 20, Pa.
CREATIVE ENGINEERS AND MANUFACTURERS OF PRECISION PROCESSING EQUIPMENT



Intensifier bar, shown through cut-away, breaks up any lumps that may have formed in the raw materials.



Photograph shows quick, easy unloading of p-k twin shell blender into special bag filling hopper, permitting further blending to proceed while bags are filled.

Insecticides and fertilizers *COMPLETELY BLENDED* with p-k twin shell blenders

Field strength insecticide dusts and fertilizers, scientifically compounded for greater effectiveness, must be completely blended for accurate dispersion of the several ingredients.

One progressive manufacturer of fertilizers in Pennsylvania, produces completely dispersed blends of horticultural fertilizers with *one* piece of equipment—a p-k 10-cu. ft. twin shell dry blender, equipped with removable intensifier bar which breaks up lumps in raw materials which develop in transit. This small company finds the p-k blender does their entire blending job—better, faster, more economically.

Blending of a full load is done in 5 to 8 minutes. Complete cleaning is quickly done, merely by flushing down the blender shell. In all, this company blends 40 different formulations.

Small operations or large process applications are all within the capabilities of p-k twin shell dry blenders, available in sizes from 4- and 8-qt. laboratory models to 75-cubic foot models with intensifier bar, to 250 cubic foot, without intensifier bar, for production line use.

When your process planning includes a blending operation, it will pay you to ask p-k for blending tests on your materials and for engineering assistance at the initial planning stage. Since p-k also makes double-cone and ribbon blenders, an unbiased analysis of your blending methods is assured. Or, write for factual literature—Catalog No. 12.

the Patterson-Kelley Co., inc.

170 Lackawanna Ave., East Stroudsburg, Penn.

Patented and patents pending

1952

101 Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 96-A Huntington Avenue, Boston 16 • and other principal cities

NO BREAKS WITH PENFLEX ON TANK SETTLEMENT

PENFLEX FLEXIBILITY ALLOWS LINES TO WALK WITH TANK

Write for this helpful folder, "Flexineering" ... your guide to flexible tubing

Heat . . . cold . . . tank settling . . . all made rigid pipe on oil storage tanks in a large New England bulk plant move, bend and break. Every break meant oil and gasoline lost . . . fire a constant threat.

Then Penflex "Flexineering" solved the problem. Pipe breakage has been eliminated with a length of 12″ I.D. four-wall interlocked, specially packed Penflex tubing . . . installed with tight-packed flanges. Now any amount of thermal expansion or tank settling can occur with no leaks, breaks or spillage. Penflex tubing is tight as a pipe . . . yet flexible under all conditions.

Let Penflex engineers help solve your tubing problems. Penflex manufactures a complete line of four-wall interlocked and seamless welded corrugated flexible tubing . . . metallic hose, tubing or couplings from 1/8″ I.D. and up . . . automatic barrel fillers, accessories and fittings.

Pennsylvania Flexible Metallic Tubing Company, Inc., 7234 Powers Lane, Phila. 42, Pa.
Branch Sales Offices: **Boston • New York • Chicago • Houston • Cleveland • Los Angeles**

PENFLEX

HEART OF INDUSTRY'S LIFE LINES

R-S valvEvents

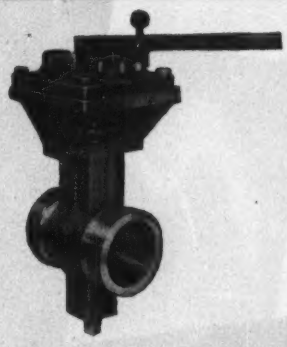
• EXCERPTS FROM THE R-S BOOK OF EXPERIENCE •

R-S Valves provide quick opening yet tight means of overflow control. Photograph courtesy William Allen Son's Company, Worcester, Mass.

Specify R-S VALVES

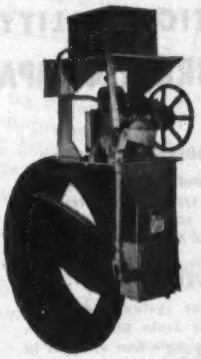
- for simplified and economical control and shut-off of volume and pressure
- with metal to metal seat including babbit or rubber seat
- for manual or any type of automatic control
- for any material that flows or is forced through a pipe
- in any material that can be cast or welded including plastics and certain alloys especially adapted to resist corrosion, erosion and temperature.
- in all sizes for all industries and processes, and in the temperature range from minus 300° to plus 2000° F. 2 to 2500 psig.

Representatives are listed in telephone directories as: "R-S Products Corporation Valves".



No. 674—Special 2½-inch stainless steel valve with 150 psi construction. Standard sanitary type threads. Heavy duty handlever assembly Type No. 681.

No. 848—Heavy duty valve with rubber seat for water service at high velocity. Handwheel operates valve through spur gear and pinion into a threaded reach rod (enclosed Type No. 700) in order to obtain sufficient torque to seat disc in rubber.



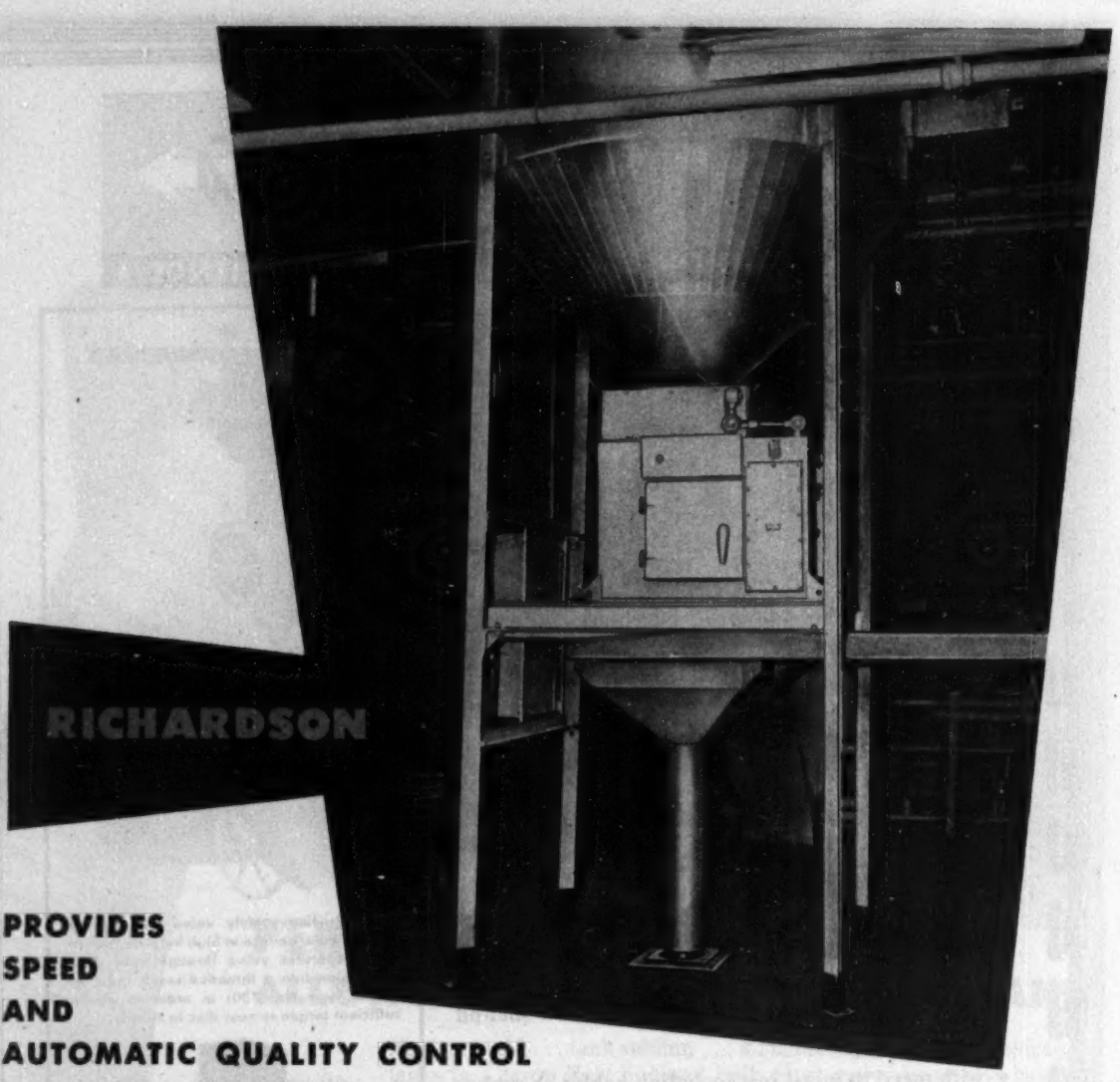
No. 847—Heavy duty valve with electric motor operator mounted directly above valve and positioned by pressure controller mounted above the motor.

Consult your local R-S Valve Engineers, or write direct.

R-S PRODUCTS CORPORATION • 4600 Germantown Ave., Philadelphia 44, Pa.

An S. Morgan Smith Company Subsidiary

DISTRICT OFFICES IN PRINCIPAL CITIES



PROVIDES SPEED AND AUTOMATIC QUALITY CONTROL

...for the MURRAY COMPANY (Division of H. A. Johnson Co.)

PROBLEM:

High labor charges and uncertain accuracies in loading sugar to syrup kettles presented a challenge to the cost- and quality-conscious management of the H. A. Johnson Co.

SOLUTION:

A suitable conveyor system feeding a Richardson Automatic Scale provided high volume, controlled accurate flow of sugar to the cookers. Another alert management had reduced their labor charge to practically nil and incorporated machine-made, repetitive accuracy into their process.

Rising labor costs *can* be offset while still maintaining both quality and quantity production. Proof of this is the Richardson installation pictured, recently completed for the Murray Company, Division of the H. A. Johnson Co., Boston, Mass. Adopting the recommendations of a Richardson field engineer, this well known manufacturer of soda fountain syrups and toppings has actually increased output at reduced unit cost. At the same time product quality is now rigidly controlled, *automatically*.

Materials handling by weight has been a Richardson specialty for more than fifty years. And every year has seen more practical applications throughout the processing industries of this wide range of experience.

At no obligation to you, a Richardson engineer will gladly call, survey your present methods, and show you the Richardson way to lower costs through efficient materials handling by weight.

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

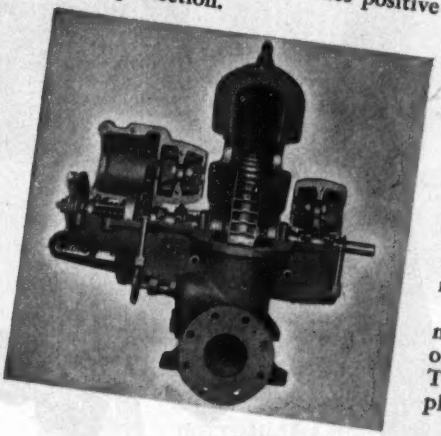
Richardson Scale Co., Clifton, New Jersey. Automatic Weigher Systems of All Types: Automatic Bulk Weighing Hopper Scales, Including Conveyor-Feed Types • Continuous Feeder-Weighers • Automatic Bagging Scales • Bag Sewing Conveyors Packers • Multi-Material Proportioning • Process Control Panels. *Branch offices in:* Atlanta • Boston • Buffalo • Chicago • Detroit Houston • Minneapolis • New York • Omaha • Philadelphia Pittsburgh • San Francisco • Wichita • Montreal • Toronto.

TERRY

PROTECTION OF TURBINE BLADES made possible by nozzle location

The Terry Solid-wheel Turbine is of the impulse, helical flow type. The steam issues from an expanding nozzle at high velocity and enters the wheel bucket where its direction is reversed 180°. As this single reversal uses but a portion of the available energy, the steam is returned to the wheel several times until practically all of the energy has been utilized. This principle makes possible the efficient use of steam in a single-piece, almost indestructible wheel.

In the Terry Solid-wheel Turbine, the steam enters the buckets in a direction at right angles to the shaft, as shown above. This design eliminates the need for close clearances and provides positive blade protection.



The blades cannot foul. There is a one inch clearance on either side of the wheel. In addition, projecting rims on each side of the buckets prevent damage to the blades even though external thrust should move the wheel.

This is only one of the many important features of the Terry Solid-wheel Turbine. Write for complete details.

THE TERRY STEAM TURBINE CO.
TERRY SQUARE, HARTFORD 1, CONN.

TT-1195

Memo

Send for a copy of bulletin S-116 which describes the many advantages of the Terry Solid-wheel Turbine.

TO MEET YOUR *Service* NEEDS PROMPTLY

SUPERIOR ELECTRIC VOLTAGE CONTROL EQUIPMENT IS AVAILABLE THROUGH AN ELECTRICAL DISTRIBUTOR CONVENIENTLY LOCATED NEAR YOU

There is an Electrical Distributor in your territory who carries comprehensive stocks of SUPERIOR ELECTRIC Voltage Control Equipment. He is a specialist carefully selected for his knowledge of your requirements and his ability to give you prompt, courteous service. He is as near as your telephone. Call him for your voltage control requirements.

TO MEET YOUR *Voltage Control* NEEDS BETTER

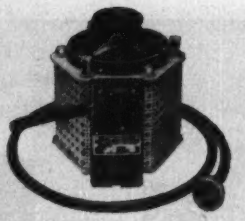
SUPERIOR ELECTRIC VOLTAGE CONTROL EQUIPMENT IS AVAILABLE IN A COMPLETE LINE FOR THE MAJORITY OF APPLICATIONS

SUPERIOR ELECTRIC designs, engineers and manufactures Voltage Control Equipment specifically to meet today's demands. A wide range of standard types in numerous capacities and ratings are offered. In addition, The Superior Electric Company — thoroughly experienced in the field of voltage control — offers to work with you in developing special equipment to meet your special needs exactly.

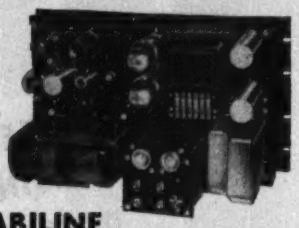
REGULARLY *Stocked and Sold*

BY OVER 1,600 LEADING DISTRIBUTORS THROUGHOUT THE COUNTRY

THE SUPERIOR ELECTRIC CO. BRISTOL CONNECTICUT

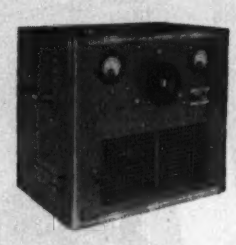


POWERSTAT
VARIABLE TRANSFORMERS

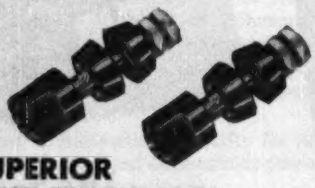


STABILINE
AUTOMATIC VOLTAGE REGULATORS

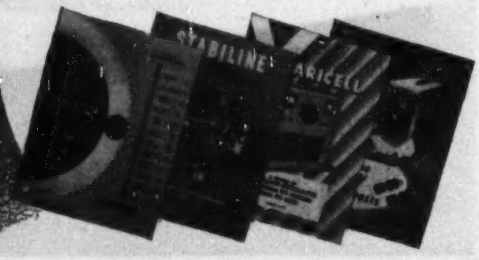
VOLTBOX
A-C POWER SUPPLIES



VARICELL
D-C POWER SUPPLIES



SUPERIOR
5-WAY BINDING POSTS



THE SUPERIOR ELECTRIC CO., 1407 Mae Ave., Bristol, Conn.
Please send me the name of the Electrical Distributor nearest me who stocks SUPERIOR ELECTRIC Voltage Control Equipment.
I am interested in ☐ POWERSTAT Variable Transformers ☐ STABILINE Automatic Voltage Regulators ☐ VARICELL D-C Power Supplies ☐ VOLTBOX A-C Power Supplies ☐ 5-WAY Binding Posts.

NAME _____

POSITION _____

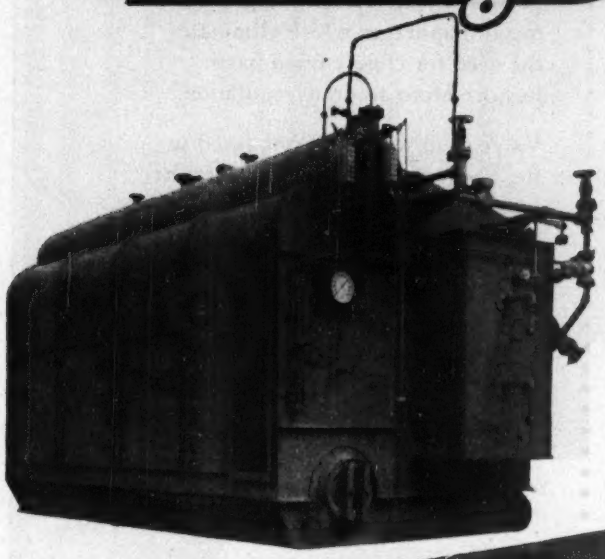
COMPANY _____

CO. ADDRESS _____

CITY _____ ZONE _____ STATE _____

Vogt

Gas Fired
PACKAGE UNIT
Steam Generators
selected by
PHILLIPS CHEMICAL CO.
Pasadena, Texas Plant



TOP: One of the completed units prior to shipment.

BOTTOM: Shop erection view shows tile and block insulation in convection wall; also main baffle tile and furnace floor tile.

Principal Data, Each Unit

25,000 pounds steam per hour capacity. Induced draft type.

Fusion welded steam and water drums designed for 425 pound S.W.P.

Completely shop assembled and required only the piping and gas outlet connections to place them in operation.

Fully steel encased for outdoor installation on a simple foundation.

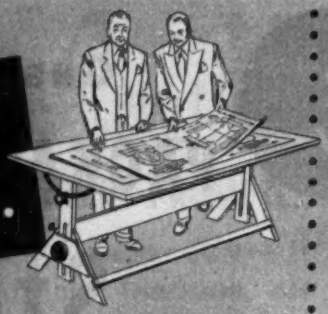
•

**Vogt Steam Generators are available in bent tube types and straight tube forged sectional header types for solid, liquid or gaseous fuels. Bulletins on request.*

HENRY VOGT MACHINE CO.
Louisville, Kentucky

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland, St. Louis, Dallas, Charleston, W. Va.

HOW SPENCE DESIGN...

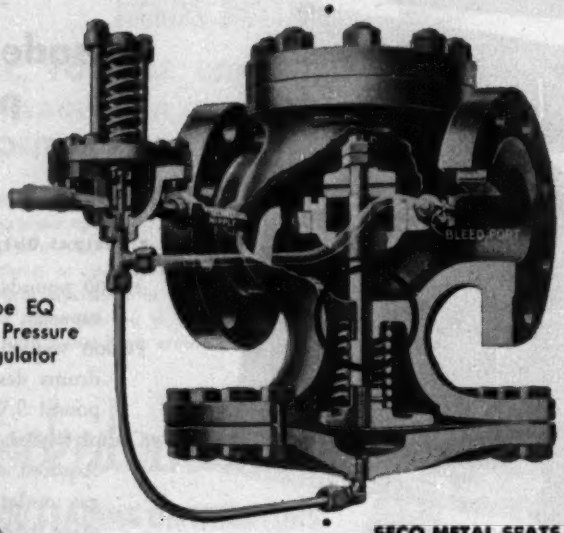


eliminates stuffing boxes

All Spence main valves and most pilots are built without stuffing boxes. This packless construction is made possible by the use of a large balanced metal diaphragm which eliminates the need for closely fitted parts. Result? More accurate regulation.

Valve stem wear is also reduced in the Spence packless design. Result? Low maintenance, years of trouble-free service.

Spence makes a wide line of automatic regulating valves: Pressure, Temperature, Differential Pressure, Back Pressure, Pump Governors and many other types. Write for bulletin 100 giving full details.



Type EQ Back Pressure Regulator

A few other design features:

SECO METAL SEATS AND DISCS— Durable SECO Metal resists wiredrawing. More than twenty years of experience in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

PROTECTED SPRINGS— The internal springs in the Spence Main Valve and Pilot are out of the path of the steam or other fluid flowing through the valve. They operate at low unit stress for exceptionally long life.

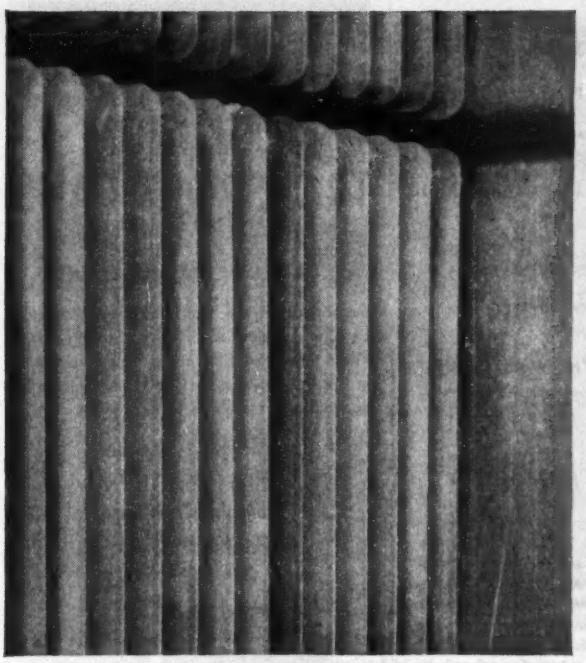
METAL DIAPHRAGMS — Located in a cooled zone with a condensate seal above and below, never have to be replaced under normal conditions.

Spence

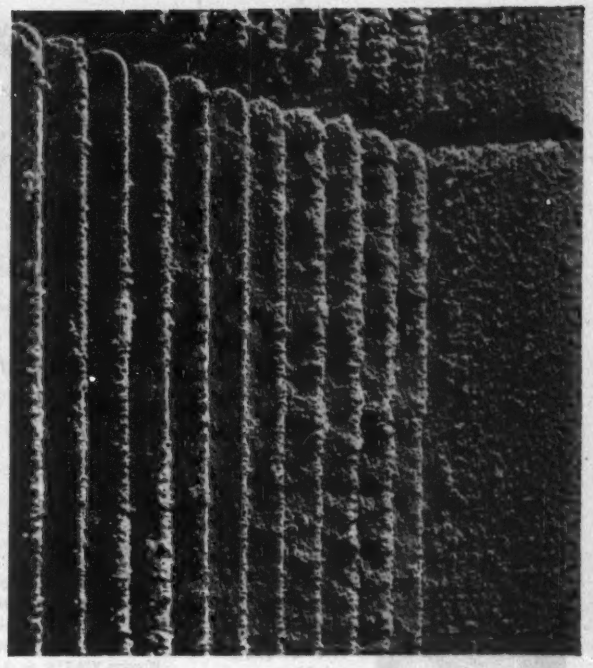
SPENCE ENGINEERING COMPANY, INC.

WALDEN, NEW YORK

SE 121



Before—PRECIPITRON® cells in close-up show clean aluminum collector plates. This is the way they appear after periodic washings, which dispose of all trapped airborne particles.



After only 2½ weeks cleaning "normal atmospheric" air, the same plates had accumulated this much dirt. PRECIPITRON stops airborne dirt, pollen, mists—even germs and smoke!

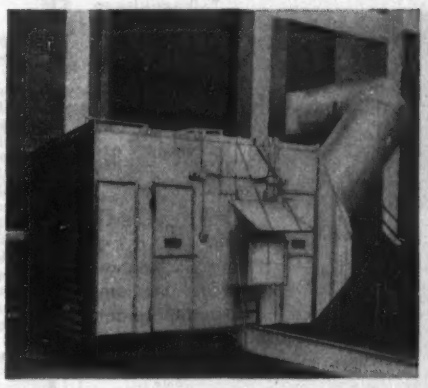
ELECTRONIC BARRIER

AGAINST INVISIBLE DIRT

Airborne particles are costly everywhere. For example, corrosive specks can mar the finished surface of finely machined parts. Contamination is dangerous in laboratories and food processing plants. In textile mills, airborne specks streak the yarns. In processes, buildings, offices—even in homes—"invisible" dirt costs you money.

But PRECIPITRON—the electronic air cleaner—will take *all* the dirt out of the air. It removes particles so tiny they can be seen only with an Ultra Microscope. The savings in controlling airborne dirt with PRECIPITRON are worth looking into today.

To help you *put air to work*—with air cleaning, air conditioning or air handling—Westinghouse offers a complete equipment line. For a free copy of General Catalog 600, call your local Westinghouse-Sturtevant Office. Or, write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.



Cleaning efficiency of PRECIPITRON is 90% or better at 333 fpm. Dirt is held on the plates until washed down. A garden-type hose flushes it directly into the drain—quickly, easily, inexpensively.

YOU CAN BE SURE...IF IT'S **Westinghouse**

AIR CLEANING

J-802278

ROTARY POSITIVE DISPLACEMENT PUMPS

When liquids must be handled at fixed rates of flow, it pays to install a Kinney Rotary Liquid Pump. These are furnished in two basic designs — the famous Model SD Rotating Plunger Pump and the unique Model HQ Heliquad Rotary Pump. Each design has specific advantages which make it the "pump of choice" for certain services. For instance, in barge and tanker service, the Kinney Model HQ Pump has the unusual ability of handling all viscosities from gasoline to heavy molasses. For handling viscous materials such as asphalt, grease, soap, etc., the Kinney Model SD is the outstanding favorite.

Kinney SD Rotating Plunger Pump.

Kinney Model HQ Heliquad Rotary Pump.

Tell us about your process pumping problems. We will gladly give you full details on Kinney Rotary Positive Displacement Pumps.

Kinney Manufacturing Co., manufacturers of liquid and vacuum pumps. Representatives throughout the United States and in foreign countries.

SEND COUPON FOR DETAILS

SUBSIDIARY OF THE NEW YORK AIR BRAKE CO.

Kinney

KINNEY MANUFACTURING COMPANY
3551 Washington Street • Boston 30, Mass.

Please send Bulletin L51 describing Kinney Rotary Liquid Pumps.

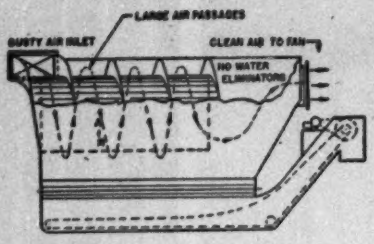
NAME_____

COMPANY_____

STREET_____

CITY_____ STATE_____

Air Tumbler



THE MASTER OF

DUST

IN INDUSTRY

NEW, yet tried in hundreds of diversified applications embracing the **MECHANICAL, CHEMICAL,** and **MINING** industries, the **AIR TUMBLER** exploits to the limit the old and proven principle of dust separation by centrifugal action to which it adds **WATER** as a trapping medium. Its **SIMPLICITY, EFFICIENCY, DEPENDABILITY,** and **ECONOMY** have made the **AIR TUMBLER** standard equipment wherever it has been tried.

For further information write to:

DUST SUPPRESSION & ENGINEERING CO.
P.O. BOX 67, LAKE ORION, MICHIGAN

DOUBLE BARREL ADVERTISING

Advertising men agree—to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

Display Advertising keeps your name before the public and builds prestige.

Direct Mail supplements your Display Advertising. It pin-points your message right to the executive you want to reach —the person who buys or influences the purchases.

In view of present day difficulties in maintaining your own mailing lists, our efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low overall cost and the tested effectiveness of these hand-picked selections.

McGraw-Hill Publishing Co., Inc.
330 West 42nd St., New York 36, N. Y.

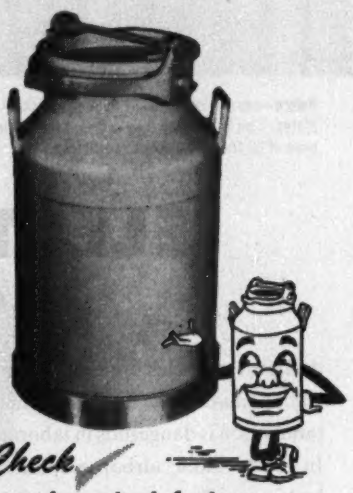
Lightweight, Heavy-Duty

ALUMINUM TRANSPORT CANS

For inside or outside transporting

Economical is the word for these transport cans. In chemical and food-processing plants where transportation costs figure so highly in the budget, they prove themselves to be economical. Here's why!

- **They'll last a lifetime!**
- **Built for heavy-duty!**
- **Completely Re-usable!**
- **They're lightweight!**



Check **these important features . . . .**

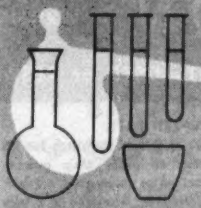
- Hermetically sealed covers.
- Good corrosion-resistance.
- They're shock-proof.
- Withstand pressure and full vacuum.
- One-third the weight of stainless steel cans.
- No visible inner seams make it easy to clean.
- Available in 3 sizes; 3 to 60 quarts.

Also available with regular standard sealed covers.

For complete detailed information and price listing send to:

Chemical and Power Products, Inc.
11 Broadway, New York 4, N. Y.

SILICATE SERVICE FOR CHEMICAL BUYERS



things you can do with PQ versatile silicates

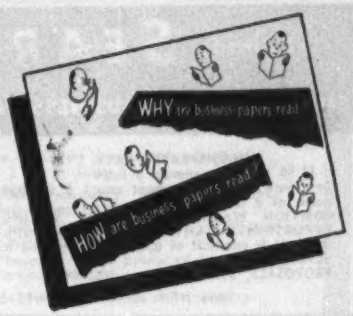
Listed below are a few of the many things accomplished with PQ Silicates. Such wide usefulness depends on the different physical and chemical qualities found in PQ's 27 liquid silicates and 16 dry products.

- Solidify foundation soils
- Improve detergent quality of soap and synthetics
- Laminate paper boards, wall boards
- Deflocculate and wash clays
- Depress siliceous slimes in ore flotation
- Control Oxygen release from peroxides
- Clean metals, paper pulp, etc.
- Clarify raw and waste waters

These uses may suggest applications of PQ Silicates in your processes. Put it up to PQ (90 years' experience in silicate-use technique.)

PQ Silicates of Soda
METSO DETERGENTS

PHILADELPHIA QUARTZ CO. 1125 Public Ledger Bldg., Phila., Pa.



A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet."

McGraw-Hill Publishing Company, Room 2710, 330 West 42nd St., New York 36, N. Y.

WHERE TO BUY

Featuring additional Equipment Materials, Supplies and Service for the Process Industries

FEED MATERIAL BY WEIGHT

THE MERRICK FEEDOWEIGHT

MERRICK SCALE MFG. CO.
171 SUMMER ST., PASSAIC, N. J.

ACID TANK LININGS

SERVICE IN THE FIELD OR IN OUR PLANT

- B. F. Goodrich Rubber and Korosoal Linings
- Synthetic paints and Amercoat Plastic Coating
- Metallizing

Ask for the Corrosion Protection Bulletin

METALWELD INC.
Scotts Lane & Abbottsford Avenue, Phila. 29, Pa.

Manufacturers of

METAL POWDERS

FLAKE
CHIP
or
GRAIN FORM

MAGNA MANUFACTURING CO., INC.
Plant: - HASKELL, NEW JERSEY

Let 37,182

Chemical Executives & Production Men Decide

If your product sells to the chemical or chemical processing industries the full scope of the market can best be determined by the men who might use it. A small ad in this section of CHEMICAL ENGINEERING will search out new uses—new users. The rates are low—the circulation 37,182 ABC—the buying influence unchallenged. For information write

WHERE-TO-BUY
CHEMICAL ENGINEERING
330 W. 42nd St., New York 36, N. Y.

CHEMSTEEL CONSTRUCTION COMPANY, INC.
501 Chemsteel Bldg., Walnut St. Pittsburgh 32, Pa.

Send data on Engineering & Construction facilities for ACID-ALKALI-PROOF CONSTRUCTION of processing & storage tanks & flooring.

NAME.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE....

DRUM ROLLER MIXER
SINGLE OR DOUBLE
For prices and information
WRITE TO THE CLEVELAND MIXER CO.
3234 West 33rd Street
Cleveland 9, Ohio

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
$1.50 a line, minimum 3 lines.
To figure advance payment count 5 average words as a line
POSITION WANTED INDIVIDUAL SELLING OPPORTUNITY WANTED undisplayed advertising rate is one-half of above rate, payable in advance.
PROPOSALS, $1.25 a line an insertion.

INFORMATION
BOX NUMBERS count as one line additional in undisplayed ads.
DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

DISPLAYED RATE:
The advertising rate is $14.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches —to a page. C. E.

Send NEW ADVERTISEMENTS to N. Y. Office, 330 W 42nd St., N. Y. 36, N. Y., for August issue closing July 2nd.

CHEMICAL ENGINEERS
LOOK AHEAD . . .

Major staff expansion in a rapidly growing, progressive organization offers a challenge to top-notch personnel, preferably with experience in polymer research and development.

The work involves: **1. Engineering economics, 2. Pre-pilot and pilot labs 3. Plant design.**

These are senior positions but men with little or no experience will also be considered. They are permanent jobs in the modern research laboratories in Summit, New Jersey, a pleasant residential community within 30 minutes of metropolitan New York City. Salaries will be based on training and experience.

Please submit complete resume, including salary desired, to Mr. S. B. McFarlane. Interviews will be arranged for qualified applicants.

Celanese
CORP. OF AMERICA
SUMMIT, NEW JERSEY

DESIGN AND DEVELOPMENT ENGINEER

Design and Development Engineer with experience in air and dust handling systems and the design of industrial dust and fume control and collecting equipment. Position requires the initiative, technical ability and experience to develop design and test practical, marketable equipment from his own ideas and those of others. Must have successful record in designing industrial equipment.

Replies treated in confidence and neither employer nor references communicated with until we have your written permission. Unusual opportunity for capable, progressive engineer interested in good future with prominent organization in growing field.

To have consideration give complete outline of experience, age, education, references, present compensation, salary expected to start.

Reply: Pangborn Corporation
Hagerstown, Maryland
Attention: **W. O. VEDDER**

TEACHING POSITIONS
IN ISRAEL

The Israel Institute of Technology, Haifa, Israel, proposes to appoint 2 Professors of Chemistry, one in Physical Chemistry; 2 Professors of Chemical Engineering, one with special qualifications in Food Technology & Biotechnology; and 1 Professor of Metallurgy.

Applicants should have first-rate professional and academic qualifications, be willing to integrate themselves into the life of the country and, in due course, to teach in Hebrew.

Applications with full details should be sent, for transmission to Haifa, to:

THE AMERICAN TECHNION SOC.
1000 Fifth Ave., New York 28, N. Y.

CHEMICAL ENGINEER

Unusual opportunity for graduate chemical, electrochemical or metallurgical engineer with 5-8 years experience in production of carbon or graphite electrodes or related products. Require man capable growing from initial staff position to line responsibility involving several plants. Prefer age 30-35 and no aversion to moderate travel. Location—Pacific Northwest. In confidential reply, give complete details on age, education, experience, and salary expected.

P-8109, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

DESIGN ENGINEER

Graduate Engineer with 6 or more years experience in process studies and process equipment design including several years in a supervisory capacity. To assist Works Engineer in supervising Plant Engineering group. Write

Diamond Alkali Company
P. O. Box 686 Pasadena, Texas

ELECTRO-CHEMIST

Exceptional position available in mid-Atlantic location for graduate electro-chemist or chemical engineer in nationally known non-ferrous metals company. Engineering or supervisory experience essential in production of chlorine or inorganic anhydrous chlorides, and/or electrolysis. Reply confidentially, giving age, education, experience, and salary expected.

P-8110, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

CHEMISTS
CHEMICAL ENGINEERS
PhD.—M.S.—B.S.

In Chemistry or Chemical Engineering

For Fundamental Research
For Process and Equipment Development

Large Midwestern Manufacturer of Molding Compounds, Coating Resins, Adhesives, and Silanes

Submit complete resume & salary requirements.

P-8137, Chemical Engineering
520 N. Michigan Ave., Chicago 11, Ill.

DEVELOPMENT ENGINEER

Mechanical Engineer wanted as Product Design & Development Engineer. Position leads to Assistant Chief Engineer. Experience in small or medium size parts manufacture desirable. Progressive company located N.E. New Jersey. Send resume.

P-8058, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

CHEMISTS AND Chemical Engineers Wanted. The Tennessee Valley Authority wants Chemists and Chemical Engineers to carry on inorganic research and development activities in chemical plants at Wilson Dam, Alabama. Several vacancies also exist for Chemists for plant chemical control work. Salaries start at $4575 and $5450 for 40-hour week. All Jobs carry automatic within-grade increases for satisfactory service, liberal vacation leave, sick leave, and retirement benefits. Write to Tennessee Valley Authority, Division of Personnel, Knoxville, Tennessee.

WANTED: GRADUATE Engineers, preferably chemical, for both Consulting and Field Sales Work. For Sales, should have 3 or more years successful record. For Consulting, young men preferred so that our business can be taught to them and they can move up in years to come. Write P-7876, Chemical Engineering.

PROMINENT MANUFACTURER of centrifugals and filters has opening for young Chemical Engineer. Position will involve field and lab work, leading eventually to sales. Office and Factory in Midwest. Send resume of education and employment history to P-7976, Chemical Engineering.

ASSISTANT TO Manager: Outstanding young graduate mechanical or chemical engineer needed as assistant to manager of rapidly growing heat transfer division. Excellent opportunity for advancement in engineering, sales and administration. Not a "drafting-board" job. Interest in aeronautics, nuclear physics, petro-chemistry or pipe line operation helpful but not essential. Write giving personal and educational qualifications. Upon receipt we will send complete information regarding position, products manufactured, and company financial report. The Trane Company, Attention: Wm. Dackis, La Crosse, Wisconsin.

(Continued on page 412)

ALL THESE BENEFITS

- BALANCE *YOUR* BUDGET
- SAVE DOLLARS AND DAYS
- INCREASE YOUR PROFITS

When you deal with this long established company

(AAA-1 RATED)

36 YEARS OF CHEMICAL HISTORY

Some American chemical developments Since 1917

1919 High frequency induction furnace introduced by Northrup.

1919 High purity electrolytic white lead produced by Sperry.

1920 Phosphoric acid produced by electric furnace smelting.

From the files of Chemical Engineering

"CONSOLIDATED"

SERVING THIS INDUSTRY SINCE 1917

WE BUY YOUR IDLE EQUIPMENT

SINGLE ITEMS

COMPLETE PLANTS

SEND US YOUR LIST TODAY!

FILTER EQUIPMENT

1—#12 Sweetland Filter for 72 monel lvs., 2" C.C.; 1—#2, 23 cu lvs. 1½" C.C.
8—Shriver 42"x42", Iron Plate & Frame, 27, 54 chambers, 1" cake.
16—Sperry 18"x18", Iron, P & F. Filter Presses, close delivery, 11 chambers.
1—American Disc Filter 6' dia., 2 disc, 100 sq. ft. filtering area, with auxiliaries.
1—Shriver, iron, steam heated, 30"x30", 20 chambers, 1" cake.
1—8'x12' Oliver Lead-Wood Vacuum Filter Acid-Resisting.
3—Oliver Vacuum Filters, incl. 8x112', 11'6"x14', 11'6"x18'.
1—Sperry 24"x24" P & F Filter Press with 25 chambers, 2" frames.

VIBRATING SCREENS

1—Tyler Hummer 4'x10', 2 deck, with 2 vibrators and generator set.
1—Battery of two 3'x5", Tyler Hummer, Type 33, with Generator Set for both.
1—3'x8' Selectro, single deck.
1—3'x8' Selectro, double deck—rebuilt.
1—18"x5' Selectro—rebuilt.
2—Day Ro Ball Size 82, dbl deck, 40"x120".
1—Rotex, sgl. deck, 20"x48".

EVAPORATORS

1—Quadruple Effect Evaporator, calandria type, brass tubes, 14,000 sq. ft. H.S.; excellent condition; still erected; complete with piping, etc.
3—Mojonnier S/S Vac. Pans, 3', 4', 6', 8'.

DOUBLE DRUM DRYERS

1—42" x 120" Buflovak Atmospheric, S/S Conveyors, Elevator & Hood.

4—Buflovak Atmospheric—5' x 12', 32" x 90", 32" x 72".

DRY POWDER MIXERS

1—12,000# jac., horiz., Ribbon Mixer.
1—Sturtevant 2000# Rotary; 1—Howes 1800# dbl. ribbon; 1—Munson Rotary 1000# batch; 1—Ransome ½ ton; 1—Readco Ribbon 700#; 2—Day 600# and 400#; 1—S.S. Rotary, 300#.

PEBBLE MILLS—LINED

1—Abbe 5' x 6', 10 H.P. motor.
2—5' x 4', 235 gal.
2—6' x 8', 800 gal.
4—Abbe, 125, 50, 25 gal.

PULVERIZERS

1—Williams 5-roll, high side.
3—Mikro Pulverizers, 2S1, 4TH.
1—6"x15" Sturtevant Jaw Crusher, to ½".
1—24"x15" Sturtevant Crushing Rolls, balanced type.
2—Raymond Screen Mills, #0A with Monel hammers, also 00.

HIGH SPEED MILLS

4—J. H. Day type B, 14" x 30", 3 roll High Speed Roller Mills, with all roller bearings and watercooled rolls—silent chain drive.

MISCELLANEOUS

5—Anderson Duo Expellers, triple tempering apparatus, M.D.
1—Patterson, 110 gal. S.S. Vacuum Mixer, dbl. sigma blades, M.D.
1—20 gal. jacketed, dbl. sigma bladed Baker Perkins Mixer, M.D.
2—Pneumatic Scale packaging lines.
3—B & J Rotary cutters; 1—#2; 1—#1, 15 H.P.; 1—Anti-friction bearings, 3 H.P.
2—Stainless horiz. 13,500 gal. welded Tanks, agitated.
3—Anco 4'x9' Chilling Rolls.
2—Buflovak 6' dia. Vacuum Crystallizers; 1—6' dia. Atmospheric, jacketed.
2—Dorr two-stage Classifiers, each with two rakes, total length 27', gear reducer and motor.
1—Davenport #3A Dewaterer.
1—Mechanical Cooker, 5' dia. x 16' long.

ROTARY KILNS & DRYERS

2—7'x60' Calciners, made by Struthers Wells. Each 9/16" shell, Timken roller bearing supports, F-B gear reducer, with V-belted AC motor, firing hood, seal ring, one with Vanderwerp-Manitowoc Recuperator, all in excellent condition and priced for quick action.
1—7'6"x125'; 1—8'x135' Allis Chalmers Rotary Kilns.
1—6'6" I.D. x 12' Rotary Nodulizer, ¾" shell, Timken roller bearing rolls, gear reducer and motor drive.
2—3'x50' Rot. D.H. Dryers and Coolers.
4—Ruggles-Coles Direct Heat Rotary Dryers—Class XF4—54"x25', 1 Class XF 5'x40'. Three 3'x50'; 5'x30'; 5'x50'; 6'x40'; 6'x80'; 7'x70'.
6—Link Belt Roto-Louvre Dryers; #207-10 (2'7"x10'), #310-16, #503-10, #604-20, two #804-24.
2—6'x50' Louisville Rotary Steam Tube.
1—5'x33' Rotary Vacuum Dryer, jacketed Shell; 1—20"x8', jacketed, with dust collector and condenser.

JACKETED KETTLES

1—Patterson Fdry. 500 gal. steel, jacketed, closed, agitated Kettle.
36—S/S Jacketed Kettles, up to 1000 gal., some agitated.
17—S/S Vert. & Horiz. open and closed Storage Tanks, up to 2000 gal.
6—Dopp C.I. 80, 100, 150, 350, 600 gal.
7—Steel, agitated, 350, 500, 700, 800.
3—9500 gal., welded, agitated, open.
29—Aluminum and Copper, 30 gal. to 600 gal., some agitated.
1—400 gal. nickel jack, closed, with condenser and pump.

BARGAIN PRICES

4—Devine #28 Vacuum Shelf Dryers, each 20 shelves 59" x 78", surface condensers and vacuum pumps.
1—Tolhurst 48" steel basket Centrifugal, susp. type, bottom discharge.
4—Traylor Tube Mills, 5' x 22', 5' x 20', 4'6" x 18'6", 4' x 13', each stone-lined, scoop feed, pebble charge, clutch pulley.

Still installed in one plant as operated with all accessories as used.

• • ONLY A PARTIAL LIST. TELL US WHAT YOU NEED • •

CONSOLIDATED PRODUCTS CO., INC.

LARGEST AND OLDEST DEALER IN REBUILT PROCESSING EQUIPMENT

2015 PARK ROW BLDG., NEW YORK 38, N. Y., BArclay 7-0600, Cable Address: EQUIPMENT, N. Y.

We have for Immediate Delivery

Stainless Steel and Glass Lined Unused Valves

We have purchased the stockroom of a large chemical manufacturer and we want to pass on to you these terrific buys.

48 —Hills McCanna 1½" Glass Lined Diaphragm Type Valves with hand wheel, Flanged Type. Approx. New Price $43.70 Ea.— Our Price **$26.22 Ea.**

13 —Hills McCanna 1" Glass Lined Diaphragm Valves, Flange Type with hand wheel. Approx. New Price $28.80 Ea.— Our Price **$17.28 Ea.**

1 —Hills McCanna Glass Lined 1" Diaphragm Valve Flange Type with quick opening handle. Approx. New Price $40.30— Our Price **$24.18**

143 —Hills McCanna Glass Lined Flange ¾" Diaphragm Type Valves with hand wheel. Approx. New Price $23.30 Ea.— Our Price **$13.98 Ea.**

27 —Hills McCanna ½" Glass Lined Diaphragm Type Flange Valves with hand wheel. Approx. New Price $22.20 Ea.— Our Price **$13.32 Ea.**

50 —Hills McCanna Series 300 Diaphragm Type Stainless Steel 1" Flange quick opening Valves. Approx. New Price $51.20 Ea.— Our Price **$30.72 Ea.**

14 —Hills McCanna Stainless Steel ¾" Flange Type Diaphragm Valves with hand wheel. Approx. New Price $29.20 Ea.— Our Price **$17.52 Ea.**

3 —Hills McCanna 2" Glass Lined Bodies. Approx. New Price $48.00 Ea.— Our Price **$28.80 Ea.**

131 —Hills McCanna Glass Lined 1" Flange Type Bodies. Approx. New Price $25.00 Ea.— Our Price **$10.00 Ea.**

32 —Hills McCanna Glass Lined ½" Flange Type Bodies. Approx. New Price $19.50 Ea.— Our Price **$11.70 Ea.**

50 —Hills McCanna 1" Stainless Steel Flanged Type Bodies. Approx. New Price $36.00 Ea.— Our Price **$21.50 Ea.**

3 —Nordstrom Hastelloy B 2" Plug Cocks Fig. #29 225 ASA&300 Symbol MA 4 WOG-600. Approx. New Price $445.50 Ea.— Our Price **$267.30 Ea.**

Due to limited stocks we suggest that you wire or send your order immediately!

Above subject to prior sale

R. GELB & SONS, Inc.,
CHEMICAL, RUBBER, OIL, PLASTIC and FOOD PROCESSING MACHINERY
STATE HIGHWAY No. 29, UNION N. J. · UNionville 2-4900

FOR SALE

One Doyle & Roth #1468-14 Horizontal Shell and Tube Heat Exchanger

The unit is constructed of 14" steel shell, steel tube sheets, steel baffles, ¾" O.D. x .065 seamless steel tubes. The front channel is arranged for eight passes and has two 1½" flanged connections, one top inlet, one bottom outlet. Shell connections are 1" flanged inlet and outlet for water, ¾" IPS vent, 1" IPS drain. Overall length of unit approximately 15'10".

THE MENNEN COMPANY
Hanover Ave. Morristown, N. J.

CONCENTRATOR EQUIPMENT

1 belt driven Marcy Ball Mill. Internal scoop feeder and 40 h.p. motor, 220-vol.

4 No. 11-D Wilfley concentrating tables, left hand with 6" tilting device.

1 jaw crusher (belt driven) with 25 h.p., 1,200 rpm., 60-c., 3-ph., 220-V, G.E. motor.

Bohn Aluminum & Brass Corporation
DETROIT 26, MICH.

CHEMIST

for large copper company Chile, South America. Must be experienced in analytical work of all kinds, including complete analysis of ferrous and non-ferrous metals etc. Three year contract. Transportation both ways and salary while traveling paid by Company. In reply give complete details.

P-8171, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

CHEMICAL ENGINEERS

An active, confidential service! Interview at your convenience.

Call, write, or wire
GLADYS HUNTING (Consultant)
DRAKE PERSONNEL, INC.
7 W. Madison St. Chicago 2, Ill.

SELLING OPPORTUNITY OFFERED

(Continued from page 410)

MANUFACTURERS AGENTS knowing the Chemical Process Industries and or pneumatics wanted by well established filter manufacturer with representatives in 25 cities. Require alert aggressive representation. Expanding activities in the following areas: Baltimore, Dallas-Ft. Worth, Indianapolis, Milwaukee, Minneapolis-St. Paul, New Orleans, Toledo. Some other territories open also. Inquire R. P. Adams Co., Inc., Box 145, Kenmore Station, Buffalo 17, N. Y.

EMPLOYMENT SERVICES

SALARIED POSITIONS $5,500 to $35,000. We offer the original personal employment service (established 43 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered, present position protected. Ask for particulars. R. W. Bixby, Inc., 362 Dun Bldg., Buffalo 2, N. Y.

SALARIED PERSONNEL $5,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection, under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. B, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

CHEMICAL ENGINEER, BSChE (1949), BS Business Admin. (night school), age 29, married, high scholastic record, now employed (since 49) as project engr. by med. sized chemical co. Desire to relocate in southern Calif. PW-8124, Chemical Engineering.

AVAILABLE SEPTEMBER 15, Chemical Engineer desires position in technical sales service or management, Southern California area. Experience administration; process eng.; industrial relations. Age 37. Minimum salary $8500. PW-8125, Chemical Engineering.

EXECUTIVE ENGINEER, 42, graduate M.E., M.S. in Chemical Engineering. Licensed Professional Engineer, N. Y. and N. J., 19 years supervisory and administrative experience in industrial and chemical plant engineering, maintenance, preventative maintenance, construction, power, organization, standard costs, budget control, supervisory training, job evaluation, fire prevention and safety; desires management position with industrial organization. PW-8198, Chemical Engineering.

SELLING OPPORTUNITY WANTED

EQUIPMENT OR Plant supplies representation, metropolitan New York and/or Phila. territory wanted by established agency handling own promotional work. RA-8147, Chemical Engineering.

SALES REPRESENTATION—Growing Sales Organization wishes to represent additional equip. mfg. on an exclusive basis in Met. N.Y., North. N.J., and S.W. Conn. Interested in heat exchangers and allied equipment, pumps, filters, control insts., etc. RA-8216, Chemical Engineering.

PRODUCTIVE REPRESENTATION

If you manufacture complete line of pumps, stainless valves or equipment for the chemical field and desire representation by manufacturers agency in Pittsburgh area, we can offer 12 years successful selling and servicing above and related equipment.

RA-8169, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

AVAILABLE

Prominent Chemical Manufacturer

In Metropolitan New York area is available for custom processing of products requiring large scale precipitation, filtering and drying equipment.

CW-8103, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

Available { CUSTOM REFINING FACILITIES
• Distillation • Extractions
• Separations • Fractionation
Drum Lots—Tank Cars

Wanted { • All Types of Crude Mixtures
• By-Products, Residues, Wastes
Contaminated Solvents

TRULAND CHEMICAL & ENGINEERING CO., INC.

Box 426, Union, N. J. UNionville 2-7360

PLANT FOR SALE

Metropolitan Area. 65,000 sq. ft. Three story brick building. 2 oil-fired boilers over 700 B.H.P. each 180 lb. rating. Building sprinklered throuout with freight elevators, 185' loading dock, and 6,000 sq. ft. yard.

Unlimited soft water and city sewage. Brick garage 10,000 sq. ft. sprinklered and heated. Easily accessible to various communities, highways and turnpike. Plant now operating with plentiful local labor.

BO-7883, Chemical Engineering
330 W. 42 St., New York 36, N. Y.

READY TO BUY

Dyes - Chemicals - Pigments - Waxes
Plasticizers - Solvents - Colors
By-Products - Wastes - Equipment

CHEMICAL SERVICE CORP.
80-04 Beaver St. New York 5, N. Y.

WANTED

Vacuum Dryers, Heavy Duty Mixers, Reactors, Kettles, Columns, Rotary Filter, Pulverizers, Filter Presses, S/S and non corrosive Tankage. Idle or Set Up Plant.

P. O. BOX 1351
Chuch St. Sta. New York 8, N. Y.

FOR SALE—WE OWN IT OR CONTROL IT!

COLUMNS—STILLS

2 Aluminum Bubble Cap Columns, 36" dia. x 45 plate.
1 Aluminum Bubble Cap Column, 27" dia. x 18 plate.
1 Aluminum Perforated Plate Column, 28" dia. x 36" plate.
1 Copper Column with 18—30" dia. perforated plates and 10—24" dia. bubble cap plates.

CONDENSERS—EXCHANGERS

1 Aluminum tub. 166 sq. ft.
15 Alum. Coil Exch. 47 sq. ft.
7 Copper tub. 20, 65, 90, 140, 1350 sq. ft.
6 S.S. tubular exchanger 14, 190, 236, 368 & 400 sq. ft.
3 S.S. Coil Condensers, 40 sq. ft.

DRYERS—EVAPORATORS

1 Stokes #59A Jacketed Vacuum Rotary Dryer, 18" dia. x 42" long.
2 Atm. Double Drum Dryers, 22" x 38".
1 Buflovak Atm., Double Drum Dryer, 24" x 36".
1 Cummer Rotary Hot Air Dryer, 46" dia. x 26" long.

FILTERS

1 Sweetland #10, 21 leaves.
1 Sweetland #12, 72 leaves.
1 Swenson Rotary Continuous Vacuum Filter; Precoat type, 8' dia. x 8' face, rubber covered and lead acid proof construction.
1 FEINC Rotary Vacuum Filter, string discharge, 4'6" dia. x 6' face, aluminum.
4 Pressure Leaf Filters, 70 to 90 sq. ft.
1 Shriver 36" Filter Press, rubber covered, closed dely.
1 Shriver 36" C. I. P.&F., 20 ch. cl. dly.
1 Louisville 8-roll Continuous Filter or Grains Press, 24".

NOW LIQUIDATING

Equipment of Patrick Henry Brewery, Marion, Indiana:

12—Horiz. Welded Steel Tanks, dished heads: 10,500, 11,300 and 12,700 gal.
6—3500 gal. Vertical Closed Welded Steel Tanks, dished heads.
22—8300 gal., Welded Steel Rectang. open top tanks—16'10" L x 7'7" W x 8'9" H.
1—4000 gal. Vertical Steel Cooker, Jktd., Agit.
1—Dracco Pneumatic Grain Conveying System.
1—Sperry 24" C.I. Filter Press, 16 Ch.
1—Ammonia Compressor with motor: 10 x 10 (82 ton).
1—Steel Shell & Tube Condenser: 1000 sq. ft.
Lot of miscellaneous equipment—pumps, coolers, scales, kettles, tanks, bottling machinery, etc.

JUST PURCHASED

1—Baker-Perkins #14-JEM Universal Mixer, jacketed, vacuum cover; 50 gal. working cap.; 50 HP motor.
3—13 gal. Autoclaves T347 Stainless Steel, 700# int. WP; jacketed 50# WP.
3—Lightnin SEV-1500 Side Entering Mixers, Stainless Steel; 15 HP.
1—Stainless Steel T304 Horiz. Tank—16,000 gal. cap.
1—Day 2-deck Shaker Screen 20 x 48.
1—Double Drum Dryer, 22" x 38, complete.
1—Stainless Steel Blending Hopper, 23 cu. ft.
2—650 ton Hydraulic Presses, 27" x 27", 18 dia. rams.
1—Stainless Steel Pressure Vessel, 600# WP, T304, 18" dia. x 9'4" L.

CHEMICAL PLANT

2—St. St. Jktd. Agit. Kettles, 450 gal.
3—St. St. Vacuum Tanks, 260 gal.
6—St. St. Tanks, 15, 100, 150, 200 gal.
1—St. St. Exchanger, 23 sq. ft.
1—St. St. Column 8" D x 26' H.
3—Adams St. St. Filters.
3—Worthite Centrifugal Pumps.
2—Shriver St. St. Diaphragm Pumps.

KETTLES—REACTORS

1 Stainless Steel, Type 347 Autoclave or pressure tank, 250# pr., Elec. heated 850° F; 17¼ dia. x 9 high.
70 Stainless Steel and Stainless Clad open top, steam jacketed kettles—40, 60, 80, 100, 150, 500 gal. sizes.
3 300 gal. T316 Stainless Steel Jacketed Tanks, 10# jkt. double motion agit.
1 200 gal. Read Stainless Steel Jacketed Kettle, double motion agit., 10 HP.
4 Aluminum Reaction Kettles, Jktd. & Agit., 25, 60, 100 gal. and 250 gal.

MILLS—PULVERIZERS

1 Paul Abbe #6 Pebble Mill, porcelain lined, 32" x 36".
1 Williams Hammer Mill, type AK; size A, stainless steel.
5 Mikro Pulverizers, #1-SH, #1-SI, #2-SI, #2-TH, #2-DH.
1 Premier Colloid Mill, 6", st. st.
1 Acme #8½A Jaw Crusher.

PLANT FOR SALE

Suitable for Chemical Manufacturing—Located Scranton, Penna., area. Two acres — half with buildings totaling 55,000 sq. ft.

Railroad siding—main highway non-restricted

TANKS

35 Aluminum Tanks, closed, 4, 275, 330, 480, 500, 1350 & 1450, 9000 gal.
9 Horiz. Welded Steel Tanks, Lastiglas Lined, 15,200 gal.
1 Vertical Rubber Lined, 6000 gal. open.
5 Vertical Jacketed Pressure Tanks—Steel—30# steam jacket—8 mm. vacuum internally:
3—34" ID x 14' H (approx 700 gal.)
1—23" ID x 10' H (approx. 230 gal.)
1—23" ID x 9' H (approx. 195 gal.)
8 15,000 gal. Vertical Welded Steel Closed Fermenting Tanks, 80 lbs. WP., turbine agitator with 40 HP motor; 970 lin. ft. 3" pipe coil. Excellent condition.

STAINLESS STEEL TANKS IN STOCK

1 16,000 gal. Horizontal.
1 5700 gal. Horiz. T304—NEW.
3 1000 gal. Rectang. open top.
50 Stainless Steel Tanks—from 9 gal. to 1000 gal. sizes.
6 2000 gal. Horizontal Stainless Steel Tanks, 5'4" dia. x 18'9" long, insulated and agitated. Excellent for transporting, storage or holding.

MISCELLANEOUS

1 St. St. Bn., T316, 275 cu. ft.
2 Bird Susp. Centrifugals, 48" dia. Stainless Steel Perforated Baskets.
1 Fletcher 30" Jr. Centrifugal Extractor, St. St. Imperf. basket.
5 DeLaval Centrifuges, models #600, 74-11 and 94-01.
2 Kux Machine Co. Model 25 Rotary Pellet Presses, 21 and 25 punch.
3 Stokes Rotary Pellet Presses, 16 punch, B-2, D-3.
4 Selectro Vibrating Screens, stainless steel, 2' x 7', double deck, enclosed
1 Stainless Steel Horizontal Sterilizer 10# pr., 24" W x 26" H x 36" L.
1 Stokes Vertical Steel Jacketed Vacuum Chamber and Impregnating tank, 30" L x25" W x 24" D.
2 Vertical Agitators—40 HP earmotor with Turbo #5B drive, 70 BPM.
1 Porter heavy duty jacketed double worm mixer—75 gal.

STAINLESS STEEL FABRICATION

"Heliarc" welding. Water-quenched welds (if specified). Specializing in lighter weight tanks (10 ga., 12 ga., 14 ga., 16 ga., etc.). Large quantity of type 304 and type 316 sheets carried in stock assuring quick delivery of tanks built to your specifications. Over 30 NEW tanks in stock for immediate shipment—from 30 gal. to 5700 gal. sizes.

Write: Attn. Fabricating Division

BOTTLING CANNING MACHINERY PERRY SUPPLIES PROCESSING

PERRY EQUIPMENT CORP.

1413 N. 6th ST.
PHILA. 22, PA.

PHONE
STEVENSON 4-7210
CABLE—PERI

MODERN REBUILT EQUIPMENT
At Great Savings

UNION — Rebuilt Modernized — Established 1912

International Stainless Steel Straightline Vacuum Filler, 160 per minute.
Resina LC automatic Capper.
Fitzpatrick Model D S.S. Comminuter.
Devine 18-shelf Vacuum Shelf Dryer.
F.M.C. Kyler A adj. Wraparound Labeler.
Burt automatic Wraparound Labeler.
S. & S. G1 and G2 Auger Fillers.
Colton 2, 3RP Rotary Tablet Machines.
Stokes 2 Cream Filler and Closer.
Triangle Elec-Tri-Pak G2C, A6CA Fillers.
Filler 4-Head and Hope 6-Head Stainless Steel Piston Fillers.
650 to 850 gal. Jacketed Mixing Tanks.
Horix S. S. 14-Head Rotary Filler.

Standard Knapp No. 429 Carton Sealer.
Mikro 4TH, 3TH, 2TH, 1SH and Bantam Pulverizers; Schutz O'Neill Mills.
Tri-Homo #5 Colloid Mill, 7½ HP.
Capem 1SF Single Head Capper.
3500 gal. working cap. Steam Jacketed, Double Arm Mixing Tanks for mixing, storing or processing of your materials.
Day 650 gal. Steam Jacketed Mixer.
B. P. 150 Gal. Unidor S. J. D. A. Mixer.
Stokes, Day, New Era, Hottman Mixers, from 2 to 450 gal., with and without jackets, Single, Double Arm Agitators.
Baker Perkins and Readco Heavy Duty 6 to 150 gals. Double Arm Jacketed Mixers with Sigma or Fish Tail Blades.

Day 100, 800, 1500, 10,000 lbs. Dry Powder Mixers and Sifters.
Lee 85 gal. S. S. Jacketed Mixing Kettle.
•Pony M, ML Labelrites; World and Ermold Rotary and Straightaway Labelers.
Oliver Sweetland #2, Sparkler, Alsop Filters.
Pneumatic Scale Cartoning Line.
Oliver cellophane adjustable Wrapper.
Hayssen 8 - 18 adj. Wrapper.
Hudson Sharp Campbell 2W6 high-speed automatic cellophane Wrapper.
Package Machy. DF, FA4, FA Wrappers.

OVER 5000 MACHINES IN STOCK — IMMEDIATE DELIVERIES
Further Details and Quotations Available On Request

Immediate Deliveries

UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street New York 2 N Y.

QUICK DELIVERY ON GUARANTEED EQUIPMENT

DRYERS & KILNS
5' x 15' Rotary Kiln brick lined, complete.
Vulcan 6' x 60' Rotary Kiln, 50 HP M.D.
2—Ruggles Coles 7½' x 60' & 6' x 45' Rotary Dryers.
1—4 fan automatic Conveyor Dryer.
2—Albright-Nell 4' x 9' Atmos. Drum Dryers.
Devine #12 Vac. Shelf Dryer, 40"x42" shelves.
1—Buffalo Vac. Drum Dryer 24" x 26".
6—Steam, Gas & Electric Dryers, Tray & Truck.
New Seco Rotary Dryers & Kilns, good deliveries.

CENTRIFUGALS & CENTRIFUGES
8—Tolhurst 40" Suspended Type Centrifugals. Bottom Discharge. Motor Driven.
8—Centrifugals 26", 30", 40", 42" & 48", Steel, Copper, Stainless & Rubber Lined.
12—Sharples Centrifuges #5A Stainless. Also #6.
3—De Laval Multiple Clarifiers #200, 300 & 301.

FILTERS
1—Vallez 4! Stainless Covered Leaf Filter, type 49.
10—Sperry & Shriver 12", 18", 24", 30", 36", Iron & Wood Filter Presses.
Sweetland & Oliver Rotary Vac. Filters.

KETTLES & TANKS
2000 gal. type 304 Stainless Vert. Tank.
1—Dopp 350 gal. CI Jack. Vac. Kettle.
Devine 30" dia. Impreg. Unit, closed Jack-Liquor & Impreg. Kettles. Also 100 gal. size.
Devine 1600 gal. closed jack agit. steel kettle.
1—2300 gal. vert. agit. Jack Steel Kettle.
8—Jacketed Kettles 50 to 2500 gals.
1—250 gal. Lead Lined Kettle.
2—Pfaudler 500 gal. vert. Glass Lined Tanks.
New Stainless Steel Tanks 50 to 3000 gals.
50—Stainless Alum., Copper, Glass & Lead Lined Kettles & Tanks. Also new Stainless.
200 gal. vert. Copper Jack. Kettle.
6—Copper Varnish Kettles 150, 200 & 300 gals.

PULVERIZERS & MILLS
Patterson 6' x 6' & 6' x 5' Pebble Mills, motor dr.
Abbe 24" x 33" Pebble Mill. Also Jar Mills.
#1 Raymond Automatic Pulverizer 20 H.P. motor.
1—Raymond #00 Pulverizer 50 H.P. Complete.
1—#0000 Raymond Mills.
1—Hammer Mills & Pulverizers 3 to 50 H.P.
1—Schutz-O'Neill 20" Pulverizer. Also #1.

1—Sturtevant 30" Rock Emery Mill.
1—Robinson 22" Attrition Mill.
1—Lehman 4 Roll W. C. 12x36" Steel Mill.
5—Lehman & Kent 3 Roll Steel Mills. 8"x22", 9"x32", 12"x36", 16"x40".
1—9" x 36" Double Steel Roller Mill.
1—9" x 24" 3 pr. high steel Roller Mills.
3—Hosokin 18 x 36", 4 Roll Granite Stone Mills.
4—Ball & Jewell & Leominster Rotary Cutters.
2—U. S. & Premier 1½ H.P. Colloid Mills.

MIXERS & SCREENS
Baker-Perkins heavy duty double arm Mixers, 100 50 & 9 gals. motor driven.
Horiz. Mixers single & double arm to 200 gal.
2—Day & Ross 15 gal. Pony Mixers.
1—Century 2 HP. 4 speed Vert. Mixer.
6—Lead & Paste Mixers 50 to 150 gals.
1—Tyler 3'x5' Vibratory 2 Deck Screen.
Patterson 42" dia. Stainless Conical Blender.
1—Master Drum Type Blender 1000#.
10—Dry Spiral Mixers 50 to 2500#.
12—Portable Elec. Agitators ¼ to 2 HP.

MISC. & SPECIAL
Andersen RB Expeller 20 HP Motor Driven.
Sly Dust Collector, Bag Type, 242 sq. ft., complete.
2—Buffalo 6' dia. Vac. Crystallizers.
Gould 75 HP. Centrifugal Pump, 250 PSI.
4—French Oil Motor Driven Expellers.
New 6 x 12" Lab Mixing Mills and Calenders.
4—Farrell 2 Roll Rubber & Plastic Mills.
3—Rubber & Plastic Extruders 1" to 6".
1—Stokes 2E Paste Filler up to 5 gal.
1—Elgin Capper ½ HP. Motor Driven.
1—Marco #200 Stainless Steel Homogenizer.
1—Stokes & Smith & Day Powder Fillers.
6—Filling Machines. Liquid Paste & Powder.
Rotary & Single Punch Tablet Machines, ½" to 3".
1—Howe Mogul Barrel Bag Packer.
2—Revolving Pans 30" & 36".
4—Stokes Vert. High Vac. Pumps.
2—Worthington 12" x 12" x 12" Vac. Pumps.
6—Devine & Buffalo Vac. Pumps.
Soap Machinery for Toilet Laundry Chip Liquid.
Plastic & Rubber Hydr. Presses, Extruders & Injection Molding Equipment.
Roller & Screw Conveyors, Bucket Elevators.
Boilers—Gas, Oil & Coal Fired.

WE BUY YOUR SURPLUS MACHINERY & COMPLETE PLANTS
PARTIAL LISTING, WRITE FOR BULLETINS. PHONE STERLING 8-9066

STEIN EQUIPMENT COMPANY
107 - 8th St., Brooklyn 15, N. Y. *Sterling 8-1944* Cable Machequip

For Sale **For Sale**

1—Eppenbach Stainless Steel Home Mixer, complete with a 7½ HP Explosion-Proof Motor.
1—Baker-Perkins 100 Gal. Stainless Steel Mixer, double-arm, sigma blades, with 20 hp explosion-proof motor.
1—J. H. Day #2, 75 Gal. Brighton Mixer.
5—Pebble Mills 40 to 500 Gal.
10—Pony Mixers, 8, 15 and 40 gal.
HIGH SPEED Roller Mills 9"x24" to 16"x40".
1—Motor Driven Belt Conveyor.
3—6" Premier Colloid Mills, watercooled.
2—2281 Mikro-Pulverizers with 10 hp Motors.

SPECIALIZING IN REBUILT MACHINERY

Irving Barcan Company
249 ORIENT AVE.
JERSEY CITY 5, N. J.
Phone—DElaware 2-6695-6

CLASSIFIERS: 6—Akins and Wemco 54" x 34' and 78" x 20½ ft., Simplex, single screw, weir type, with synerogear motor, 220/440 volt, with lifting device. Condition like new, available now. Three located Nevada.

LOCOMOTIVE CRANE: Link Belt 25 ton capacity, standard R. R. gauge, gasoline powered, cast steel trucks, air brakes, with or without 1¼ yd. Williams clam shell bucket, thoroughly modern, excellent condition. Located Minnesota.

COMPRESSOR: Worthington DC2, 20/18½ x 21, 600 H.P. synchronous motor, 440 volt, with all auxiliary equipment.

BLOWERS: 2—36", capacity 39500 C.F.M. @ 14.7 lbs., 500 H.P. motor, 3 phase, 60 cycle, 2300 volt.

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phones: MAdison 3-8300—3-8301

FOR SALE
Excellent Used Equipment from Distillery Operation
Copper & Stainless Tanks, Copper Stills & Condensers, Pressure Cooker, Emulsifier, Grain Mills, etc. For details contact:—
SOUTHWEST METAL CO.
P. O. Box 215 Glassport, Penna.

Cast Your Eyes Over These BRILL Buys!

Outstanding Selections Backed by Our Quarter Century of Service and Dependability!

DRYERS—KILNS

1—Vulcan 7'x160', 5/8" shell, two 12" tires complete.
1—Vulcan 8'x120', 5/8" shell, two 12" tires complete.
2—Allis Chalmers 9'x80', 5/8" shell, 2—12" tires complete.
1—5'6"x25', 1/2" shell, two 6" tires.
1—Louisville 38"x25' steel Hot Air Rotary Dryer.
4—Rotary Dryers 5'x67', 4'6"x50', 4'x30', 3'x25'.
2—Hersey 6'x23', 5'x23' Hot Air Rotary Dryers.
4—Louisville Steam Tube Dryers 6'x50', 6'x30', 5'x28', 3'x20'.
4—Buflovak single door vacuum shelf Dryers having 20—42"x42" shelves.
4—Devine single door vacuum shelf Dryers, having 20, 8, 6 and 4-40"x43" shelves.
5—Stokes & Buflovak Rotary Vacuum Dryers 30"x8', 3'x15', 6'6"x38'.
1—Single Drum 4'x9' Flaker.
1—14 Truck steam heated Dryer 1680 sq. ft.
3—Buflovak 6' diameter, Vacuum and Atmospheric Crystallizers.

FILTERS

2—Oliver Monel 8'x10' Rotary-Vacs.
1—Oliver SS 8'x10' Rotary-Vac.
2—Eimco 4'x5' Rotary-Vacs complete with pumps, drives, piping, etc.
3—Oliver 5'3"x3', 3'x1' Rotary Vacuum Enclosed Precoat.
8—Oliver Rotary Vacuum 11'6"x18', 11'6" x14', 8'x12', 8'x10', 8'x8, 8'x6', 3'x1'.
1—Feinc steel 8'x12' Rotary-Vac.
2—Sweetland #12 with 72 and 36 leaves.
1—Sweetland #10 with 18 leaves.
1—Sweetland #7 with 27 leaves.
3—Vallez 500 sq. ft. Rotary Pressure.
1—Sperry 36" Recessed, 48 chambers, c.i., open delivery.
5—Shriver 30" P&F, 30 chambers, c.i., open delivery.
8—Sperry 24" P&F, 16 chambers, c.i., Closed delivery.
1—Shriver 24" Recessed, 30 chambers, c.i., open delivery.
3—Shriver 18" Recessed, 30 chambers, c.i., open delivery.
2—Sperry Aluminum 30" and 24" P&F, 22 and 26 chambers.
10—Shriver Sperry Filter Press Skeletons 42" to 18".

CENTRIFUGALS

2—NEW Tolhurst 48" center slung Stainless Steel, perforated baskets, motor driven.
1—Bird 48" Suspended steel, bottom discharge, perforated basket.
1—Fletcher 48" Suspended Aluminum bottom discharge, perforated basket.
1—Fletcher 40" Suspended, SS, bottom discharge, perforated basket.
1—Tolhurst 32" Suspended Monel, bottom discharge, perforated.
1—Fletcher 30" Suspended Steel, bottom discharge, perforated.
1—Tolhurst 26" Suspended, steel, bottom discharge, perforated.
1—NEW Bird 36"x50" solid bowl, 317 Stainless Steel.
2—Bird 36"x50" solid bowl, rubber and stainless.
4—Bird 36"x72", 36"x50", 24"x38", 18"x 28" solid bowl continuous, steel.
3—Sharples #16P Monel & Stainless Steel Super Centrifuge.

LOOK!

2—Link-Belt 6'4 x 24' Roto-Louvre Dryers 316 SS.
1—Link-Belt 3'10" x 14' steel Roto-Louvre Dryer.
1—Hersey 4' x 26' Monel Hot Air Rotary Dryer.
1—Hersey 3' x 24' Stainless Steel Hot Air Rotary Dryer.
1—Baker Perkins, Size 14, JEM double arm, jacketed Mixer, 50 HP motor.
1—Kritzer Lime Hydrator, 6 stage, 14' dia.
1—Goslin Birmingham 4' x 8' solid nickel Flaker.
1—Link-Belt 2'7" x 8' Monel Roto-Louvre Dryer.
2—Milton Roy Duplex Proportioning Pumps, 212 GPH at 1500# pressure.
1—Baker Perkins 35 gal. stainless Steel, jacketed, double arm Mixer, Sigma Blades.
1—Day 50 gal. stainless steel jacketed, double arm Mixer, Sigma Blades.
4—Pfaudler New 1500, 1000 gal. glass lined Reactors.
1—#2TH stainless steel Mikro Pulverizer.
2—Closed stainless steel Tanks, 1500 and 1000 gal.
1—Hardinge 4½' x 16" Conical steel lined Ball Mill 30 HP.
1—Banbury #1A Mixer with 100/50 HP motor.
5—Heat Exchangers stainless steel shell and tubes 50 to 300 sq. ft.
2—Pfaudler 100 gal. glass-lined Stills with condensers and receivers.

PULVERIZERS

1—Bauer 36' Attrition Mill 2-50 HP mtrs.
8—Patterson 6'x8', 5'x6', 4'x5', 4'x4½' Pebble Mills.
5—Abbe 3'x4', 3'x3½' Pebble Mills.
2—Premier Colloid Mills 8" dia., SS.
1—Premier UB-6 Colloid Mill, Stainless Steel, 3 HP motor.
1—Jeffrey 36"x24", Hammer Mill.
3—Raymond, Gayco Mechanical Separators 14', 12', 4'.
2—Mikro No. 151, No. 1SH Pulverizers.
1—Fitzpatrick Comminuting Mill, 7½ HP. Mtr.
2—Sturtevant 5"x8" Roll Crushers.

SCREENS

5—Sprout Waldron SS, single deck,40"x 84".
1—Day Ro-Ball single deck 40"x120".
3—Orville Simpson #42 Rotex Sifters 40"x84" screens.
4—Rotex #42, #22, and #11 single and double deck Screens.
1—Robinson double deck 20"x50".
5—Tyler Hummer 3'x5' triple deck.
6—Tyler Hummer 3'x15', 3'x10', 3'x5' single deck.
1—Abbe #2 Blutergess Sifter.
1—Selectro Double Deck 18"x48".

MIXERS

1—Baker Perkins JUMM jacketed, double arm, dispersion blades, 100 HP.
1—Baker Perkins, Type VI, Class BB, Size 15, 100 gallon double arm, Sigma Blades, jacketed.
1—Baker Perkins 300 gal. Unidor ss.
1—Day 30 gal. Imperial, jacketed, double arm, sigma blades.
1—Baker Perkins ½ gal., jacketed.
1—Patterson 5' dia. Conical steel.
1—Day 2000# steel Powder Mixer.
1—Robinson 4000# steel Powder Mixer.
6—Rodgers 200 to 3000# Powder Mixers.
8—New Portable Agitators ¼ to 5 HP.
4—Day, Ross 8 and 50 gal. Pony Mixers.

MISCELLANEOUS

10—Bucket Elevators steel housing 34' to 60' centers, 8"x5", 10"x6" buckets.
1—Lummus 4' dia. steel bubble cap col.
4—Buflovak, Zaremba and Kilby Evaporators, single and multiple effect, 300 to 16,000 sq. ft.
7—Stokes Vacuum Pumps 15 to 100 CFM.
5—Devine, Buflovak, Condensers and Receivers, 20 to 90 sq. ft.
1—Newman 2500# Soap Crutcher.
4—Groen 150, 125 gal. stainless steel, jacketed, agitated Kettles.
8—Stokes DD2, BB2, D4, D3 and B2 Rotary Tablet Machines.
4—38" dia. stainless steel Revolving Pans.
3—Nash #TS12, AL671 and #4 Vacuum Pumps.
7—Olivite, Duriron, rubber, Karbate and Haveg Centrifugal Pumps 6" to 2".

BE CO. BRILL EQUIPMENT COMPANY
A SINGLE ITEM . . . OR A COMPLETE PLANT

BRILL EQUIPMENT COMPANY
2401 THIRD AVENUE • NEW YORK 51, N. Y.
Telephone: CYpress 2-5703 • Cable: Bristen, N. Y.

BRILL FILLS THE BILL! Write, wire or phone us for complete information

CHEMICAL EQUIPMENT

502-20 LINK-BELT ROTO LOUVRE DRYER
Complete Unit

CENTRIFUGES
24" Bird, type CH, SS.
36"x50" Bird, rubber covered.
40"x60" Bird, rubber covered.
40" Fletcher, type 304 SS.
40" Tolhurst, perforated.

FILTERS
8'x12' Feinc, rotary, vacuum.
8'x10' & 11'6"x18', Oliver.
No. 12 Sweetland, 32 leaves, Monel screen.
36" Shriver. C.I., 36 chambers.

HEAT EXCHANGERS
5740 sq. ft. chrome-moly tubes.
1035 sq. ft. Braun, 4 pass.
1024 sq. ft., 8 pass.
3640 sq. ft., 2 pass., Admiralty tubes (NEW).
400 sq. ft., 2 pass., Admiralty tubes (NEW).

KILNS—COOLERS—DRYERS
7'x160'x⅜" (2).
7'x120'x⅜".
310-16 Roto-Louvre.
604-24 Sta. Steel Roto-Louvre.
5'6"x25'x9/16" Allis-Chalmers.
5'x30'x⅜" Ruggles Cole.
4'x30'x⅜".
4'6"x40'x⅜" Traylor.
6'x35' Louisville Steam Tube, complete.

REACTORS—ACID GLASS
400 gal. Pfaudler, ASME.
500 gal. Pfaudler, ASME.

REACTORS—STAINLESS STEEL CLAD
3,000 gal. Jackt'd ASME (NEW).

STORAGE TANKS
1350 gal. vert. 78"x5'3"x½" ASME.
3400 gal. 7'3"x10'9"x⅜" Type 430 SS.
6000 gal. 8'x15'x⅜" vert. ALUMINUM.
6500 gal. TANK CAR TANKS. 76"x28'.
8500 gal. 8'x23'x5/16" vert. (NEW).
12,000 gal. 8'x32'x¼" (NEW).
15,000 gal. 10'6"x23'x¼" (NEW).
135,000 gal. 30'x26' w/coils.
(We have facilities for building of new tanks. Send us your inquiries.)

PRESSURE VESSELS
1050 gal. 4'x12'x½" 106 PSI.
1200 gal. 42"x16'x5/16" ASME 125 PSI.
1250 gal. 4'x14' 106 PSI.
1650 gal. 66"x11'x⅜" jktd., glass-lined 150 PSI.
8200 gal. 6'x40'x2" 390 PSI (4).
16,000 gal. 96"x45'x¾" ASME 150 PSI.
30,000 gal. 10'x47' ASME 50 PSI.

MISCELLANEOUS
AUTOCLAVE—2000 gal. jkt. & int. 200 PSI.
REBOILER—2200 sq. ft. 84" x 16' x ⅜", 960—11/16" tubes, 40 PSI.
CONDENSER—Surface, 1035 sq. ft. Braun.
CONVEYOR—Belt, 18" troughing, 100' cc. rubber covered.
CONVEYOR—Screw, 16" SS, 16" pitch 15' long.
CRUSHER—Two roll, 14"x16" spiked rolls.
DIGESTER—Jktd. 3900 gal. ASME U69, 75 PSI.
ELEVATORS—Bucket, 10' to 50' centers, 5"x5" to 15"x12" buckets.
KOMBINATOR—SS, Flowmaster K200 & motor.

Phone or Write for complete descriptions, prints and prices. Ask for our current catalog.
• Send us your surplus equipment lists •

Heat and Power Co., Inc.
70 PINE STREET — HANOVER 2-4890 — NEW YORK 5, N. Y.
Machinery & Equipment Merchants

YOUR PREFERRED SOURCE FOR GOOD REBUILT EQUIPMENT

E—Evaporators Steel, 250 and 2500 gals.
G—Quimby Pumps 1½ Double Shaft
U—Unscrambler, Inland 22" x 6' Long
I—Intensive Simpson Mixer Size "O" Style M
P—Pulverizers Mikro #1—2—3 & 4
M—Mills Patterson Jktd 6' x 16' & 4½' x 5'
E—Ejector, Two Stage 9" type B 33
N—Nash Hytor Pump Model L 6
T—Tablet Machine, Stokes RD 4 Complete

C—Cutters Rotary Abbe #1—2 & 3½
L—Louisville Rotary Dryer 6' x 50'
E—Elmco 8' x 8' Vacuum Filter Complete
A—Autoclave 3500 gal. Jktd. & Agtd.
R—Reactor, type 347 SS 30 gal. Cap.
I—Imp Mill Raymond New S.S. #40
N—New Steel & SS Ribbon Mixers
G—Groen SS Jacketed Kettles, all Sizes

H—Horizontal 10,000 gal. Steel Tanks Welded
O—Orville Simpson 20" x 45" Sifters
U—United Oliver Filter 5' x 12' & 3' x 12"
S—Sparkler Filters Model 23-D 17 & 14-S-7
E—Evaporating Dish, Glass & Nickel Clad

WHAT HAVE YOU FOR SALE?
for BETTER BUYS & SERVICE
Phone SOuth 8-4451—9264—8782
You can BANK on

EQUIPMENT CLEARING HOUSE, INC.
289-10th ST., BKLYN 15, N. Y.

FOR SALE
4 ft. Stainless Steel Vacuum Pan.
32" x 90" & 36" x 120" Double Drum Dryers.
200 gal. S.S. Tank, 36" x 48", 1½ H.P. agit.
250 gal. S.S. Tank, 42" x 42", agit.
100 to 200 gal. S.S. Mix Tanks, water jkt.
3000 gal. S.S. Truck Tanks, Trailerized.
75 gal. Monel Jkt. Kettle, 35" x 22", agit.
40 & 100 gal. S.S. Clad Jacketed Kettles.
150 gal. S.S. Jkt. Kettle, 42" x 34", agit.
4—60 gal. Steel Kettles, 75# Jkt., A.S.M.E.
75 to 1500 gal. Homogenizers or Viscolizers.
28" Centrifugal Extractors, copper baskets.
⅛ & ¼ H.P. Portable Mixers.
Model 1486 Stokes High Vacuum Pump, 1½ H.P.
1½" Blackmer Rotary Pump, ½ H.P.
Roots Connersville Blower, 2 H.P.
30 ton Howe Suspension Tank Scale.

Send us your inquiries
LESTER KEHOE MACHINERY CORP.
1 East 42nd Street — New York 17, N. Y.
MUrray Hill 2-4616

HORIZONTAL MIXERS

2—1500# cap. dope mixers, glass lined, lgth. 11' dia. 5', steel constr.

2—1500# cap, dope mixers, glass lined, lgth. 10' dia. 4', cast iron constr., steam jacketed, 15# press.

These units are self-supporting bases, motr. driven. Prices and further information on request.

DALTON SUPPLY CO.
2829 Cedar St. — Phila. 34, Pa.

JAW CRUSHER—3½x4½, 8½x14½, 11x28.
ROLL CRUSHERS—12½x12, 16x10, 16x24 Single.
MILLS—HARDINGE—Conical, 5'x8", 6'x22" Ball, 7'x36" Pebble.
MILLS—HAMMER—Wms. LG 1, Reg. #1, GA 30, Jeffrey 24x36—B-3 w/motors.
PULVERIZERS—Raymond #47 Imp, 5047 Ring. Sturtevant #1 Ring.
CONVEYOR—New 14" Screw, 24" Troughing.
HYDRATORS—Line—Clyde Kuntz Continuous.
DUST COLLECTORS—Dravco 4 compartment, 1080 sq.ft., stocking.
PUMPS—Viking 4" w/ 15 HP motor, I.R. centrifugal, motor pumps to 850 gpm.
CLAMSHELL BUCKET—3 Yd. Wms., digging.

LAWLER COMPANY
Durham Avenue — Metuchen, N. J.
Metuchen 6-0245

DEPENDABLE PROCESS EQUIPMENT
All Items In Stock . . . Ready for Your Inspection And Immediate Delivery

S. S. Steam Jacket kettles up to 250 gal.
Powder mixers 50 to 2000 pounds
Charlotte Colloid Mills, MS & MSO
Buflovac Dbl. Drum atmospheric Dryer 42x100
Pfaudler 10 gal. jacketed glass lined reactor w/ agitation
Laughlin Horiz. Continuous Filter
S. S. Tanks 50 to 2000 gal. agitation avail.
Boilers 2 h.p. to 500 h.p. Oil or Gas Fired
Mikro Pulverizer 4-TH with extra screens
Lehman 5-roll Mill 12" x 36" water cooled
50 Fairbanks Morse Hammer Mills 2000 to 4000 lbs cap.
J. H. Day Rebolt Sifter size 61, screen 40" x 120"
Le Bour Acid Pumps
Proctor and Schwartz 84 tray dryer
Portable Electric Liquid Mixers 1/3 to 3 h.p.

We Buy and Sell Complete Plants or Single Items — CALL, WIRE, WRITE YArds 7-3665

WE SELL THE WORLD OVER

NEWMAN TALLOW & SOAP MACHINERY CO. INC.
ESTABLISHED IN 1899
1051-59 WEST 35TH STREET
CHICAGO 9, ILLINOIS

RENTAL OR SALE
EXISTING
BOILERS
10 TO 5000 HP — 10 TO 900 PSI
DIESEL ENGINES — STEAM TURBINE
GENERATORS
5 TO 20,000 KW
DEAN G. STRICKLER & ASSOCIATES
3220 Pennington Ave. Baltimore 29, Md. Cortland 4414
1346 Conn. Ave. Washington 6, D. C. Dupont 7-1166

"Buy Reliable Equipment at Reliable Dealers"

PARTIAL LISTINGS

1—Simpson #2 Intensive Mixer.
1—Komerak Greaves Briquette Machine
1—Dryer, Monel Lined 48" x 32' Rotary
1—Raymond #47 Imp Mill 50 H.P.
1—Pf. 500 Gal. G.L. Vac. Receiver
2—S.S. Condensers 370 Sq. Ft. Ea.
1—Sweetland Filter #12
1—Ind. 12" Filter Press, Bakelite Plates & frames
1—Sperry 24" C.I. Filter, Hyd. Closure
2—Bird 48" S.S. Sus. Style Extractors.
4—Vac. Shelf Dryers 6, 10, 13 & 17 Shelves.
1—Buflovak 6' Jack. Vac. Crystallizer.
4—Stokes 212 C Vac. Pumps 100 cfm.
4—Stainless Centrifugal Pumps 1½" & 1".
7—S.S. Jack. Kettles 100 to 300 Gals. with Ag.
1—Horiz. Stainless Tank 2,450 Gals.
1—Horiz. Stainless Tank 16,000 Gals.
1—Rotex Screen 40" x 120" M.D.
3—Bubble Cap Columns Alum. 27" x 36".
2—Erie City 200 H.P. Oil Fired Boilers 150# W.P.
1—Stainless Clad Autoclave 1500 Gals. 300# W.P.
1—Day Nickle Jack. & Vac. Double Arm Mixer—10 Gals.

Fillers, Labelers, Cappers, Conveyors, Pebble & Ball Mills, Roller Mills etc. Send for Bulletin A-31 with complete listings.

We buy single items to complete plants

The MACHINERY & EQUIPMENT Corp.
533 West Broadway New York 12, N. Y.
GRamercy 5-6680

ROTARY DRYERS & KILNS

Kilns: 4'x28', 4'x45', 5'x50', 5'x70', 6'x60', 6'x80', 5½'x7'x80', 7'x45', 7'x64' & 8'x80'.

MISCELLANEOUS EQUIPMENT

Hammer Mills: Jeffrey 36x24B. 75 HP Motor.
6'x15' & 7'x17' Autoclaves.
Dings 60"—3 Roll Type IR Magnetic Separator.
12'x10' Dorrco Drum Filter.
40'x30' Dorr 3 Tray, 4 Compartment Thickener.
6x8, 6x10, 7x8 & 8x6 Ball Mills.
#1 Raymond Automatic Pulverizer.
2 Siv Type 360 Dust Filters, each 19000 Sq. Ft.
2'x15' & 6'x22' Rake Classifiers.
10'x48" Hardinge Air Classifying Ball Mill.
4'x7' Peripheral Discharge Rod Mill.
Heavy Media Separation Units—#1 & #2.
Hercules Junior 3 Roll Pulverizer.
Clyde-Kuntz Continuous Hydrator.
7 Electric Air Compressors, 1300, 3100 & 3374 Ft.
135-8000 & 10,000 Gal. Tank Cars.
45 Ton Plymouth Diesel Locomotive.
1750 Ft. Chgo. Pneu. Elec. Compressor.

STANHOPE, 60 E. 42nd St., N. Y., 17, N. Y.

JAW CRUSHERS—7" x 12" up to 42" x 48".
CRUSHING ROLLS—16" x 10" up to 54" x 34".
GYRATORY CRUSHERS—#3 up to #13. Also one 14". 16" & 42" Superior McCully gyratory crusher.
SWING HAMMER MILLS.
ROTARY FINE CRUSHERS—#1, #1½ and #2.
DIRECT HEAT ROTARY DRYERS—3' x 25', 5' x 50'.
SEMI INDIRECT HEAT ROTARY DRYERS—10' x 40' & 80' x 45'.
5' x 30' Christie indirect heat rotary dryer, BV.
#222-#322-#636 A.-C. type B Hydrocone Crushers.
Hardinge, Marcy & Fuller-Lehigh mills.
RAYMOND MILLS—#0, #00, #1.
sdc.
TUBE ROD & BALL MILLS—4' up to 5' dia.
AIR SEPARATOR—5', 6', 8', 14' x 16' dia.
1—Complete Lime Hydrating Plant.
1—600-1100 & 1500 bbl. Cement Plant.
New—Used & Rebuilt Kilns—Coolers—Dryers.

W. P. HEINEKEN, INC.
30 Broad St., N. Y.
Tel. Whitehall 4-4236

GOOD USED AND REBUILT EQUIPMENT WILL "PAN OUT" FOR YOU TOO!

AUTOCLAVES (Includes Vulcanizers, Sterilizers, Retorts, etc.)

3549—Stainless Jacketed Autoclave; 10" x 15"; 3000 PSI; Agitated.
3259G5—Steel Hor. Autoclaves with tracks; 66" dia. x 14'7" long.
3598—2600 Gal. Steel Jkt'd. Agitated Pressure Vessel; 8' x 7'.
R4-302—Horizontal Steel Autoclave; 5' x 16'; Jacketed; Agitated.
V4-303—Horizontal Steel Autoclave; 52" dia. x 12'; with tracks.
V4-304—Adamson Autoclave; 6' x 15'; with inner tracks.
V4-282—Biggs Vulcanizer; ASME code; 6' x 14'; quick open door.
R4-226—HI Pressure Steel Autoclave; 300 PSI; 6' x 21'; Jkt'd. Agt'd.
V4-268—Steel Autoclave; 8' x 26'; coil heated; tracks, pump, receiver.
R4-301—Globe Rotary Kier; 14' Diameter with 15 HP motor.
V4-305—Horizontal Heavy Steel Pressure Autoclave; 7' x 8'; quick open doors.
R4-251—Struthers Wells Jacketed Steel Rotary Autoclave or Digester 100 PSI-ASME; 9'6" x 12'; with 7½ HP motor.
R4-306—Devine Steel Jacketed Rotary Autoclave or Carbonator 6/8 clad; 150 PSI-ASME; 6' x 8'6".

KETTLES

3340—Brand NEW Stainless Steel Kettles good for 100# always in New York stock; sizes up to 500 gal. Immediately.
3496—Stainless Clad 30 gal. steam jacketed Kettles; 40#.
3424 K9—Stainless 475 Gal. Kettle; Jkt'd. Agt'd.; 4' x 5'.
K7-151—Stainless 175 Gal. Cooling Kettle Jkt'd. 36" x 46"; 2 way Agitator.
3862 D1—Creamery Pkg. Stainless Jacketed Pasteurizing Kettle; 40" x 29".
3273—Pfaudler Glass Lined Jkt'd. & Agt'd. Kettle 47" x 67".
3444—Pfaudler Glass Lined Jkt'd. 350 Gal. Kettle 54" x 36"; agitated.
3597—Special Lot of Copper Jacketed Kettles from 10 gal. to 250 gal.
3673 L5—250 Gal. Copper Jacketed Agitated (scraper type) Kettle.
K3-150—Dopp 150 Gal. Cast Iron Jacketed Kettle; 47½" x 29½".
3434—Dopp 650 Gal. Cast Iron Jacketed and Agitated Kettles.
3939—New Buflovak 500 Gal. Steel Jkt'd. & Agt'd. Kettle; 4' x 5'2".
3218—5200 Gal. Steel Jacketed Closed Top Kettle; 9'6" x 9'10½".
3247—Aluminum Steam Jacketed Kettles from 25 gal. to 200 gal.

REACTORS

3424 K4—Stainless Reactor/ oil heated agitated; 24" x 48".
3361—Stainless Jkt'd. Agitated; 18" x 24" with condenser.
3417—Stainless Jkt'd. Agitated Reactor; 24" x 40".
3549—Stainless Jkt'd. Autoclave; 3000 PSI; Agitated; 10" x 15".
3673 L9—Pfaudler Glass Lined Jkt'd. Reactor; 18" x 28".
3544—Pfaudler Glass Lined Jkt'd. Reactor; 4' x 4'; 75 PSI.
3320—Stainless 250 Gal. Agitated Reactor; 36" x 50".
3424 K2—Monel 250 Gal. Jkt'd. Agt'd. Reactor; with Condenser and Accessories.
3670—Steel Reactor 4' x 4' heated with copper coil unit.
3424 K8—Stainless 475 Gal. Reactor 4' x 5' Jacketed and Agitated.
3168—Stainless 500 Gal. Jacketed Reactor; 6' dia. x 30" straight side.
3168 D7—Dopplop Jacketed Reactor; 40" x 8' high.
3350—Buffalo 500 Gal. New Jkt'd. Agt'd. Reactor; 4' x 8'2" motorized.
3273—Pfaudler Glass Lined Jacketed, Agitated Reactor; 42" x 67".
3434—Dopp 650 Gal. Cast Iron Full Jkt'd. Agitated Reactor; 80" x 67".
R4-230—Stainless 600 Gal. Reactor with Reflux Condenser; 5 HP agitator.
3327—Copper Steam Jkt'd. Vacuum Reactor; 650 gal. 54" x 7'.
3113 E2—Copper Vacuum Pan; coil heated; 2000 Gal. 7' diameter.
R4-227—Cast Iron 1000 Gal. Nitre Pot; U' x 6'; agitated 5 HP motor.
3398—Steel 2800 Gal. Jkt'd. Agt. Reactor; 8' x 7'.
R4-231—Stainless Reactor; 2800 Gal. 7'6" dia. 125PSI internal.
R4-229—Steel Reactor; 3000 Gal. 10'5" x 4'10"; Jacketed; Agitated.
R4-225—Steel Reactor; 3500 Gal. 8' x 16' x 9"; Jacketed; Agitated.
2755—Steel Reactor; 54" x 96" with steel receiver, same size.

MIXERS (Heavy Duty Dough and Mass Mixers)

3293 E5—J. H. Day S/S 5 gal. Double Arm Jkt'd. Mixer; Vacuum Cover.
3566—Baker Perkins S/S Double Sigma Arms; 12" x 6½" x 10"; 2 HP XPL.
2940—Ross No. 2 Double Arm Mixer; 18" x 12" x 18" with 3 HP motor.
3533 E 3—J. H. Day No. 2; Jkt'd. 20 Gal. Double Arm Mixer; 20¾" x 16" x 16".
M28-212—J. H. Day Cincinattus No. 4 Sigma Arm Mixer; 50 Gal.
M28-213—J. H. Day Jkt'd. Hor. Mixer; 36" x 36" x 60" with 5 HP PL motor.
2109—J. H. Day Jkt. Ribbon Mixer; 175 Gal. 28" x 26" x 70".
2337—W. & P. Type Jkt'd. Double Arm 100 gal. Mixer, geared both ends.
3677 D1—Baker Perkins Size 17 Class BB Type VII Shredding type Jacketed Mixers; double sigma arms; geared both ends; 43½" x 83" x 44".
M13-192—Simpson 24" Laboratory Size Mix Muller.
3668 S2—Lancaster Mix Muller No. 3 with Skip Hoist.
3427—Lancaster Model EAG4 Mix Muller, complete with all accessories.

HAMMERMILLS, CRUSHERS, GRINDERS, PULVERIZERS

3665 W1—Bantam Mikro Pulverizers; SH screw Feed; motorized.
3658 W2—Gruendler Supermaster No. 1 Hammer Mill; 15 HP.
3331—Mikro No. 2 TH screw feed with Pre-Breaker.
3324 E2—Mikro No. 4 Pulverizer; 15" x 24".
M10-102—Fitzpatrick Model K Comminutator with 15 HP motor.
M10-204—Reitz RD 12 Stainless Disintegrator with 30 HP.
M10-200—Reitz RD 18 Stainless Disintegrator with 75 HP.
3293—N1—Raymond Imp Mill 9" x 18" with accessories.
2383—Raymond Model No. 00 Aut. Pulverizer, with accessories.
1001 N1—Williams Model NF Hammer Mill; 25" x 14"; requires 60 HP.
3429 A7—Williams Hammer Mill 36" x 18"; requires 60 HP.
3429 A-5-6—Williams Hammer Mill No. 4 18" x 48" requires 60 HP.
M10-130—Williams Hammer Mill No. 40 Pulverizer 200 HP fan cooled.
3429 A6—Gruendler Pulverizer 12" x 48" requires 150 HP motor.
3192 A1—Gruendler Pulverizer No. 3 chamber 8" x 16".
3429 A9—Gump Bar Nun No. 40 Hammer Mill; 12" x 40"; requires 60 HP.
3545—Jay Bee Model A4 chamber 12" x 18" with 25 HP motor.
M10-183—Jeffrey Swing Hammer Mill Type E 42" x 30" for 100 HP motor.
M10-191—Stedman Type BX 20" x 12" Swing Hammer Mill; 40 HP motor.
M10-180—Riley Duplex Attritor requires 250 H.P. motor.
3168 D2—Sturtevant Jaw Crusher 8" x 10"; rated 10 Ton ore per hour.
3277—Robinson 20" Double Runner Attrition Mill; two 10 HP motors.
3529W—Bauer 24" Double Runner Attrition Mill with two 20 HP motors.

BALL and PEBBLE MILLS

M3-25—Patterson Steel Ball Mill Type D; 2' x 3'; 7½ HP motor, balls, etc.
M3-26—Abbe Steel Ball Mill; 2'6" x 3'6"; 7½ HP with steel balls.
M3-27—Moore Jacketed Ball Mill; 4' x 5'; 15 HP XPL Gearhead motor.
3443—International 5' x 6' Porc. Lnd. Pebble Mills; 50 HP Gearmotors.
M14-28 Patterson Buhr lined Pebble Mill; 2'6" x 3'6"; direct drive.
M14-29—Patterson Porc. Lined Pebble Mill; 3'0" x 4'; direct drive.
3564—Abbe 50 gal. Porc. Lined Pebble Mill; 29" x 30".
M14-193—Abbe Buhr Lined Pebble Mill; 32" x 36"; 2 HP motor.
3403—Abbe Buhrstone Lined Pebble Mills; 54" x 60"; arr. direct drive.
7673—Large Stock of Jar Mills; single or multiple; all sizes.

FRED. R. FIRSTENBERG Pres.

FIRST MACHINERY CORP.
157 HUDSON ST. WOrth 4-5900 NEW YORK 13, N. Y.

BUY AMERICAN . . . YOU BUY 50 YEARS OF DEPENDABILITY IN AIR COMPRESSORS • VACUUM PUMPS

A FEW REPRESENTATIVE UNITS FROM OUR STOCK OF OVER 300 COMPRESSORS—

ALL MAKES—CAPACITIES AND PRESSURES

80 CFM 6x5 Worthington HB
122 CFM 7x7 Ingersoll ES-1
211 CFM 9x9 Worthington HB
436 CFM 12x11 Ingersoll ES-1
861 CFM 17x11 Ingersoll ES-1

NEW PORTABLE AND REBUILT — TESTED — GUARANTEED

25 CFM Lindsay (Gas) 2 Pneu
30 CFM Lindsay (Gas) 2 Pneu
60 CFM Worthington (Gas) 2 Pneu
70 CFM Smith (Gas) 2 Pneu
105 CFM Ingersoll (Oil) 2 Pneu
105 CFM Worthington (Gas) 2 Pneu
105 CFM Worthington (Gas) 4 Pneu
160 CFM Worthington (Gas) 2 Pneu
160 CFM Worthington (Gas) 4 Pneu
210 CFM Worthington (Gas) 4 Pneu
315 CFM Worthington (Gas & Diesel)
315 CFM Ingersoll (Oil) 4 Pneu
500 CFM Worthington (Diesel) 4 Pneu
600 CFM Worthington (Diesel) 4 Pneu

3-WAY SERVICE

- *1—WE SELL REBUILTS. . .*
- *2—WE BUILD COMPRESSORS . . .*
- *3—WE RENT COMPRESSORS . . .*

CHICAGO PNEUMATIC TWO STAGE
Vertical Duplex Class-Y-C 18/11x10 with three Step Control
885 CFM 100-125 Lb. 300RPM—150HP
1060 CFM 100-125 Lb. 360RPM—175HP
1180 CFM 100-125 Lb. 400RPM—200HP
Direct connected Synchronous or MULTI-V-DRIVE
Two available Rebuilt—Guaranteed
INSPECTION INVITED

VACUUM PUMPS (DRY)

41 CFM Ingersoll 6x4
46 CFM American 6½x6
60 CFM Ingersoll 5/5x3½
82 CFM Ingersoll 6/6x4
150 CFM Ingersoll 10x5
158 CFM Fuller C-46
276 CFM Chicago 12x6
720 CFM Worthington 18x7
800 CFM Worthington 18x9
1085 CFM Worthington 21x9
1184 CFM Worthington 22x9
1623 CFM American 24x11

AMERICAN AIR COMPRESSOR CORP.
N.Y.CHickering 4-7665 · North Bergen, N.J. Union 5-4848

*OUTSTANDING

1—Sharples Super-D-Canter s/s with 15 HP XP motor
2—Shriver 18" s/s filter presses, 4 eye, closed delivery
4—Sweetland #12, 7, 5 filters, hydraulic closing device
2—Oliver 5'4" x 6' vac filters, 25% submergence, complete
4—Buflovak & Devine driers, 9, 13, 17, & 20 shelves,
1—Buflovak s/s 24" x 48" rotary vac drier, jktd
1—Ross bronze 300 gallon horizontal jacketed mixer.
6—Stainless steel condensers 8, 12, 35, 55, & 100 sq. ft.
1—Haveg "60" 1000 gal closed tank

*A Few Selected Items Out of Our 5000 Item stock

CHEMICAL & PROCESS MACHINERY CORP.
146 GRAND ST.
NEW YORK 13, N. Y.
Worth 4-8130

NEW AND GOOD-AS-NEW EQUIPMENT

#316 Stainless Steel Tanks, new, 100, 200 & 360 gal.
1—Stainless Tank #430 Chrome, vert., 7'x10' deep.
20—Jacketed Kettles—Stainless, Copper, Aluminum.
1—Day mixer, Steam Jacketed, 50 gal. Sigma Blade.
1—Robbins Vibrex 3x6 Vibrating Screen, single deck.
1—Copper Evaporator, steam jacketed, 9'1"x3'9".
50—New Pressure Cookers, 18"x18" & 24"x28".
30—Pumps—steam and electric.
1—New Glass Nash Centrifugal Pump, 160 gpm.
1—Jeffrey Vibrating Conveyor 15' lg, 12" wide.
1—Buflovak Jacketed Impregnating Tank 42"x52".
1—4x8 Sturtevant Jaw Crusher.
1—Ribbon type Mixer, steam jacketed.
1—Model 16 Sharples Stainless Steel Centrifuge.
3—New Drum Rollers.
1—A. F. Bartlett Hog Mill & 7½ H.P. Motor.
10—Tanks, 9'6"x30'—15,500 gal. each.
3—Stainless Steel Jacketed Filters.
1—Gaulin Stainless Steel Homogenizer, Type CGC, 125 gph, with 5 H.P. 3 phase motor—like new.
1—Shriver 18" Aluminum Filter 9-plates, 9-frames.
4—Stokes Rotary Tablet Machines RD4.
10—New Sharples Oil Purifiers.

SPECIAL: 3—Dopp Kettles with Agitators, 725 gal. cap.—like new.
3—Tankcar Tanks 10,000 gal. each, with coils—used for molasses.
2—Large Steam Jacketed Horizontal Mixers.

We are liquidating several large chemical plants—Send us your inquiries.

H. LOEB & SON :-: 4643 LANCASTER AVE. PHILADELPHIA 31, PA.

STAINLESS STEEL TANKS IN STOCK

1 5700 gal. Horiz. T304—NEW
3 1000 gal. Rectang. open top.
1 1000 gal. Vert. closed
50 Stainless Steel Tanks—from 9 gal. to 1000 gal. sizes
7 3000 gal. Horizontal Stainless Steel Tanks, 5'4" dia. x 18'9" long, insulated and agitated. Excellent for transporting, storage or holding.

PERRY EQUIPMENT CORP.
1413 N. 6 St. Phila. 22, Pa.
Phone STEVENSON 4-7210

ROTARY CONVERTERS

Two 1500 KW Westinghouse rotary converters, 250 DC volts, 6000 DC amperes, 6 phase 60 cycle, 450 RPM, each with 13.8 KV transformers, and AC and DC switchgear.

One 3000 KW General Electric rotary converter, 250 DC volts, 13000 DC amperes, 6 phase 60 cycle, 300 RPM, with 13.8 KV transformer and AC and DC switchgear.

Address: Sales Department

Pennsylvania Salt Mfg. Co. of Wash.
P.O. Box 1297 Tacoma 1, Wash.

STAINLESS STEEL VALVES

Surplus stock of several thousand valves in type 316 and Durimet, sizes ½" thru 4", including lubricated plug, "Y", diaphragm, gate, globe and check.

Manufacturers include Nordstrom, Durco, Aloyco, Hills-McCanna, Jenkins, Powell and others.

Stock list mailed on request.

ANCHOR SUPPLY CO.
1742 Fourth Ave. South Seattle 4, Wash.

HYDRAULIC PUMPS

2—Worth. hydraulic vert. triplex pumps, type N.Q. fig. 1845, ser. nos. 1084902, 1234510, size 1-¾x6, 23.4 GPM, water liquid; disch. pres. 2300# PSIA, 125 RPM, disch. 1½", suction 2", mounted on steel base for motr. drive, requires 40 HP motr, but no motr, new 1944, in splendid cond. Price on request.

DALTON SUPPLY CO.
2829 Cedar St. Phila. 34, Pa.

STAINLESS STEEL PREMIER COLLOID MILL

Paste type, direct coupled to geared-up 30 H.P. motor. 8" Rotor at 7200 R.P.M. Jacketed for heating or cooling. Operated 15 hours. Guaranteed condition at 50% factory cost.

Windemere Sales Co. Red Hook, N. Y.

FOR SALE!

SURPLUS and SALVAGE

100 TON CAPACITY HOWE SCALE

including structural steel and saddles to support an 8' x 30' weight tank. The tank thickness—5/16" shell tested at 60 PSI, cap. 11,000 gallons.

STAINLESS STEEL TANKS

Type 347

Size 4' wide x 4' deep x 25' long, 1/4" plate.

STAINLESS STEEL AGITATOR PROPELLER BLADE 10' DIA.

MG SET BATTERY CHARGER

Mfg. by Hertner Electric Co. Generator input 40 HP, 208 volts, 60 cycles, 3 phase, 120 amp, D-C to 24 KW DC current output, 40 volts, 800 amps. Equipped with 2 control panels 750 DC ampmeter, 75 V DC meter, rheostat, power switch and automatic timer, 4 panels, 6 amp. hour meter, switches, magnetic coil panels for charge control. 17 Exide charge controls, model MP. AC supply 115 volts, 60 cycle, TVR operating volts 77°F, 38 volts.

2 AMMONIA VERTICAL WEIGH TANKS

5' ID x 12' x 1" thick.
Working pressure 200 PSI.

We carry thousands of different items in stock at all times—send us your inquiries.

★

MACHINERY AND STEEL DIVISION

United Iron & Metal Co., Inc.

2545 Wilkens Ave., Baltimore 23, Md.

Telephones: Gilmor 5-5600, 5-5601

STORAGE TANKS

—Prompt Shipment—

GLASS LINED TANKS — USED — 3000 gallon capacity. Welded construction—Fully insulated. Equipped with manhead. Suitable for milk, food products, lily white chemicals, solvents and fine lacquers.

VARNISH TANKS—USED—54" diameter x 14'6" high (or long) 1/4" Steel — Welded construction — 1700 gallons.

MISCELLANEOUS TANKS—Various sizes and types.

ERMAN-HOWELL DIVISION

LURIA STEEL & TRADING CORP.

332 South Michigan Ave.
Chicago 4, Ill.

Telephone: **Wabash 2-0250**

THE NATION'S

Exclusive Specialists in Rebuilding

BLOWERS · FANS · EXHAUSTERS

★ **Here is the *"largest stock in the world"* of blowers, fans, and exhausters—both new and rebuilt. Our 27 years' experience and factory-trained men assure you of the best in air-moving equipment. A partial listing is shown . . . write for our detailed list.**

ROTARY-POSITIVE BLOWERS

MAKE	SIZE	TYPE	Max. Press.	Max. Cap.
Connersville	8 x 20	RS	1½	600
Roots-Con.	36	AF	2	70
Roots-Con.	3	NS	2	76
Connersville	20 x 60	SF	2½	6040
Sutorbilt	2520	SD	3	16
Roots-Con.	22	XA	3	16
Sutorbilt	3L	SD	3	69
Roots-Con.	47	AF	3	124
Roots-Con.	59	AF	3	200
Roots-Con.	615	AF	3	366
Roots-Con.	717	AF	3	650
Connersville	10 x 15	SD	3½	890
Connersville	8 x 15	B	4	530
Roots-Con.	17B	XSB	5	40
Roots-Con.	55	XAS	5	96
Sutorbilt	3L	SD	6	31
Sutorbilt	4M	SD	6	76
Sutorbilt	5M	SD	6	115
Roots-Con.	22 x 36	HD	6	5500
Roots-Con.	53	AF	7	70
Connersville	10 x 12	HD	7	614
Sutorbilt	5H	XB	10	66
Sutorbilt	6H	XB	10	128
Roots-Con.	8 x 6	HD	10	215
Sutorbilt	10 x 11	HD	10	480

80 others in stock.

TURBO BLOWERS

MAKE	SIZE	H.P.	Volume c.f.m.	Static-oz.
Buffalo	4E	½	450	
Max-Premix	1	½	95	1.69
Max-Premix	5	¾	200	2.3
N. American	3	1	34	3.50
Spencer	Belt drive		35	7.32
Spencer	50½	½	60	8
N. American	308–B1–½	½	100	8
Gen. Blower	890–¾	¾	180	8
West. Prod.	1	1	300	8
N. American	308–D12	2	575	8
N. American	308–D13	3	850	8
Eclipse Fuel	6815–½	7½	1100	9
Sturtevant	No. 2	1	215	10
Fisher Furn.	F–15	1	300	10
Fisher Furn.	F-20	2	390	10
Buffalo	40	5	750	10
Buffalo	6E	7½	1650	10
Spencer	075½	½	60	12
Buffalo	5E	5	900	12
Gen. Blower	1601	1	100	16
Spencer	1002	2	225	16
N. American	316–C2–2	2	275	16
Spencer	1005	5	600	16
N. American	1716–G	5	675	16
Chgo. Blower	1607	7½	980	16
Spencer	1007–H	7½	1075	16
N. American	1716–H	7½	1100	16
Eclipse Fuel	6819–10	10	1200	16
Power Engrg.	2010	10	1120	20
Spencer	1203	3	335	20
Spencer	1215	15	1675	20
Ingersoll-Rd.	FS-377	85	10500	20
Ingersoll-Rd.	FS-377	150	15000	20
Ingersoll-Rd.	24C-223	3	270	24
Gen. Blower	2425	25	2500	24

60 others in stock

CENTRIFUGAL FANS

MAKE	SIZE	TYPE	Wheel Diam.	Inlet Diam.
New York	36	ME	36	39½
U. S. Air	36	B/C	36	37¼
Buffalo	6	LL	36½	37¼
American	6	HS	36	37¼
Thermo Ht Fan	60	MIH	37¼	36
Clarage	3	HV	39	40¾
U. S. Air	39	M	40	34
Bayley	7	B/C	38½	39¾
Sturtevant	8½	Des. 6	39¼	40⅞
Bayley	8	I	40	41
American	6½	B/C	39¾	45⅞
American	7	HV	44	50½
Buffalo	8	CL	48	48
New York	49	ME	49	53¾
American	9	AHS	53¾	61

200 others in stock.

STEEL PLATE EXHAUSTERS

MAKE	TYPE	SIZE	Type Wheel	Wheel Diam.
American	E	35	Rim	23
Sturtevant	Des. 2	40	Rim	24
Bayley	SS	30	SS	25
Buffalo	SP	40	Rim	26
Sturtevant	Des. 2	35	SS	27
Garden City	SP	30	Cycloid	28
Cyclone B.P.	SS	40	SS	29
Sturtevant	Des. 2	45	SS	32
Sturtevant	Des. 1	55	Rim	33
American	E	55	Open	36
Clarage	IE	23	Open	36
Garden City	Cycloid	55	Cycloid	39
Sturtevant	SS	50	SS	40
Sturtevant	SS	55	SS	44
Buffalo	SS	50	Wool	45
Alington-Cur.	SS	60	SS	48
Buffalo	SS	70	Cotton	48
Alington-Cur.	SS	70	SS	56
Sturtevant	ME	70	SS	56
Alington-Cur.	SS	80	SS	64

110 others in stock.

Save 30% to 50% on Air Moving Equipment

- HEATING
- VENTILATING
- AIR CONDITIONING
- VACUUM SERVICE
- AERATION
- AGITATION
- GAS & OIL BURNERS
- BLOWING
- PNEUMATIC CONVEYING

Fully Guaranteed
We Feature
Leading Makes

★

IMMEDIATE DELIVERY

★

WM. W. MEYER & SONS, INC.

8243 ELMWOOD AVE., SKOKIE, ILL.

Chicago Suburb — *Chicago Telephone* — KEystone 9-8260

WE OFFER

DRYERS

1—Roto Louvre 5x20' monel metal.
1—Devine 18x12" vac. drum, st. st.
2—Bonnot Rotary Kilns 8x50'.
2—Bonnot Rotary Kilns 5x45'.
2—8x40' Rotary Hot Air.
1—4½x25' Rotary Direct Heat, oil.
1—7'x45' rotary Kiln, ⅝" shell.
1—6x32' Rotary—direct heat.
1—Kemp 400CFM. Dynamic Dryer.
1—Davenport #3A bronze rotary Press.

Centrifugals and Clarifiers

1 set 3—36" American suspended (two with stain. steel perforate basket).
1—40" Tolhurst suspended rubber covered perforate basket.
2—De Laval 54-81 Clarifiers, 3 hp.
3—Sharples airtigh: Clarifier, stain. steel, 3 hp.

Evaporators and Vacuum Pans

1—New 36" Hennsey st. steel Pan.
1—Rogers 42" st. steel.
1—20 gal. Stokes st. steel Vacuum Pan.
1—Swenson sgl. eff. Evap. 120 sq.ft.
1—Swenson quad. eff. Evap., 3500 sq.ft.
1—Zaremba trip. eff. Evap., 1500 sq.ft.
1—Swenson trip. eff. Evap., 850 sq.ft.

Filtration Equipment

1—Elmco rotary vacuum, st. steel.
12—Cast Iron recessed and plate and frame Filter Presses, 7" to 36".
1—Aluminum 30" 40-chamber P&F. press.
1—Lead 24" 36-chamber P&F. press.
1—Oliver 8x14' Filter.
1—Oliver pressure, iron, 110 sq.ft.
5—Aleop, Lomax internal pressure Filters, stain. steel and bronze.

MILLS

1—Prater No. 8DS, 50 hp.
3—Micro SH, 15I, 4TH.
1—Attrition, Sprout-Waldron 20".
12—Pebble and Jar Mills, 1 to 235 gal.
5—Colloid Mills and Homogenizers, 3 to 15 hp.
10—Hammer Mills, ¾ to 50 hp.
2—Pot Mills, cast iron, 18 and 36".
6—3-roll Mills, Day, 12x32" and 18x40".
1—2-roll Rubber Mill, Birmingham, 12x24".

MIXERS

1—Readco 250 gal. work. cap. stain. steel dbl. arm, 50 hp.
7—Baker-Perkins, Read, Lynn-Superior dbl. arm, 1 gal. to 100 gal.
2—Day 3000# jacketed horizontal ribbon.
10—Day, Robinson Powder type, 50 to 2000#.
3—2 hp. Aleop 1150 RPM. portable type.
6—Steel Mixing Tanks, 50 to 600 gal.

TANKS

30—Stainless Steel (some with agitators) new and used, up to 10,000 gal.
2—1000 gal. steel jacketed (100 psi.) open top.

MISCELLANEOUS

Screens: Rotex, Selectro, Tyler-Hummer.
Heat Exchanger: Karbate, 16.5 sq.ft.
Vacuum Pumps: Stokes 105 CFM.
Sanitary Pumps: Waukesha size 55, 100.
Tablet Press: Stokes DD2 rotary.

.WE BUY • WE SELL
Single items
"IT PAYS — TO TRADE — WITH LOEB"
Complete Plants
Phone BRunswick 8-5326

LOEB
EQUIPMENT SUPPLY CO.
1927 WEST NORTH AVE. CHICAGO 22

Davenport Rotary Press—3-A.
Clayton 100 HP Steam Generator.
DeLaval Centrifugal Still—100 G.P.H.
Buflovak double drum dryer, 32"x100" complete, Prater Mill included.
Buflovak double drum dryer 32"x72" complete, Prater Mill included.
Buflovak double drum dryer 32"x32" complete, Mill included.
Stokes Vacuum Pump, 105 CFM, complete.
Lightnin D-1, D-2 & D2A slow speed portable agitators.
Filter Presses 12" to 36" P&F or recessed.
In Stock At All Times: New & Used Kettles. 5 to 1000 gal. S/S or Plain steel.
Robinson Gardner type mixer—model J—42.5 cu. ft. capacity.
2—6000# Ribbon Mixers, jacketed, 100 PSI.
S & P Size 15, double arm Mixer, jacketed 40 PSI.
Portable agitators—with new motors.
Additional mixers in stock—ribbon and sigma blades, laboratory or 5 ton sizes.
3000 gal. S/S horizontal tanks—installed.
Complete line of S/S & Plain steel tanks in stock at all times.
40 gal. NEW S/clad Kettles, complete, 40 PSI $180.00 ea.

We have a complete inventory of Chemical Processing Equipment on hand at all times.

SEND US YOUR INQUIRIES

AARON EQUIPMENT COMPANY
1347 So. Ashland Avenue,
Chicago 8, Illinois

FOR SALE

Rotary Kiln—Vulcan Iron Works—8' dia. x 80' long. Feed Hood, Combustion Chamber, Oil Burner and Controls, and other auxiliaries. Variable speed drive.

Ball Mill—Hardinge Conical 10' x 48", 2200/4400 V 400 HP Motor. Reverse Loop Classifier. Blower and Separator. Vent Dust Collector.

Sample Mill—Includes Allis Chalmers Type R 222 Crusher: Aerovibe Screen & Roll Crusher, Bucket Elevators, Chutes, etc.

Thickeners—Dorr, Type A with Steel Tanks. (3) 26' x 10', (1) 24' x 10', (1) 12' x 8'.

Descriptive list of other Chemical & Metallurgical equipment furnished upon request.

THE VULCAN DETINNING CO.
SEWAREN, NEW JERSEY

STEEL STORAGE TANKS
5—8' x 45'—½" 80 LB. PRES.
3—30,000 Gal. 11' x 43' x 5/16" Horiz.
12—10,000 & 20,000 Gal. 5/16" Horiz.
14—8 000 & 10,000 Gal. R.R. Car Tanks.
2—18,000 Gal. 10' x 33'—1" Thick.
Located ILL., N. Y., KANS. & GA.
LESTAN CORP. ROSEMONT, PA.

Prompt ANSWERS

to business problems . . .

MISCELLANEOUS business problems are daily being solved quickly and easily by the use of the Searchlight (classified advertising) Section of this and other McGraw-Hill publications.

When you want additional employees, want to buy or sell used or surplus new equipment, want additional products to manufacture, seek additional capital, or have other business wants — advertise them in the Searchlight Section for quick, profitable results

American Machinist
Aviation Week
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical World
Electronics
Eng. & Mining Journal
E. & M. J. Markets
Engineering News-Record
Factory Mgt. & Maintenance
Fleet Owner
Food Engineering
Nucleonics
Power
Product Engineering
Textile World
Welding Engineer

Classified Advertising Division
McGraw-Hill Publishing Co.
330 W. 42nd St., New York City 36, N. Y.

SWENSON WALKER CRYSTALLIZERS
Six Sections. In three units each 20 feet long. Good condition with gear drive. Price $500.00 per section.
BOOTY RESINEERS, INC.
112 Jefferson St. Newark, Ohio

SOMETHING YOU CAN TRUST . . . .

—JUST AS YOU CAN TRUST EQUIPMENT FROM

GELB

2—Oliver Rotary Vacuum Filters, 5'3" x 6', Steel Construction with Monel Screens.
1—Oliver Homogenous Lead Filter, 8' x 8'.
1—Sperry Aluminum Plate & Frame Filter Press, 42" x 42", Closed Delivery, 3" Frames, 35 Chambers.
1—Pfaudler 100 Gal. Glass Lined Jacketed Vacuum Distillation Unit with Stainless Steel 60 Sq. Ft. Condenser and Stainless Steel Receiver.
1—Pfaudler Glass Lined Storage Tank, 1000 Gals.
1—Pfaudler Glass Lined Jacketed Vacuum Reactor, 500 Gals.
1—Pfaudler Glass Lined Jacketed Kettle with Anchor Type Agitator, 150 Gals.
1—Glascote 1600 Gal. Glass Lined Jacketed Vacuum Kettle
3—Day #30 Imperial Jacketed Double Arm, Sigma Blade Mixers, 75 Gal. Working Capacity.
1—Link Belt Stainless Steel Roto-Louvre Dryer, #310-16.

THE GELB GIRL—JULY, 1953

DRYERS—KILNS

1—Vulcan Rotary Kiln, 7'x120'.
7—Devine Vacuum Shelf Dryers, 5 & 9 Shelves.
1—Buflovak Double Drum Dryers, 32"x90".
1—Louisville Steam Tube Dryer, 6'x50'.
2—Buflovak Vacuum Drum Dryers, 24"x20".
1—Devine Rotary Vacuum Dryer, 5'x25'.
2—Buflovak Double Door Vacuum Shelf Dryers, 20 shelves each.

FILTERS

2—Oliver Steel Filters, 5'3"x6'.
1—Shriver Stainless Steel Filter Press, 24"x 24", Closed Delivery, 10 Chambers.
3—Shriver 24"x24" Aluminum Plate & Frame Filter Presses, Closed Delivery, 35 Chambers each.
1—Sperry 42" C I Plate & Frame Filter Press, 16 Chambers, Closed Delivery.
1—Sperry 12" Bronze Plate & Frame Filter Press, Closed Delivery, 9 Chambers.
1—Shriver 42" Evedur P&F Filter Press, 48 Chambers. Closed Delivery.
3—Shriver 36"x36" C I P&F Filter Presses, Closed Delivery, 24 & 25 Chambers.
5—Sweetland Filters, #2, 5, 7 and 12.
1—Oliver Rotary Steel Filter 3'x1'.
1—Shriver 24"x24" cast iron, closed delivery, filter presses, 3 eye, 23 chambers.
2—Sperry C I closed delivery Filter Presses, 24"x24", 30 chambers.

CENTRIFUGALS

1—Fletcher Stainless Steel Suspended Type Centrifuge, 40" Perforated Basket.
2—A. T. & M. S S Susp. Centrifuges, 48" Imperforated Baskets.
1—Fletcher 40" Centrifuges, Bronze Perforated Basket with Motor.
1—Tolhurst Stainless Steel Suspended Type Centrifuge, 40" Imperforated Basket.
1—Fletcher 48" Centrifuge, Bronze Perforated Basket, Motor.
1—Sharples Stainless Steel Super D Canter, Model PN-14.
6—Sharples #16-Y Stainless Steel Super Clarifying Centrifuges.

MIXERS

1—Baker Perkins S.S. Jacketed Double Arm Mixer, Sigma Blade, 9 gal.
3—Baker Perkins Steel Jacketed Mixers, 200 gal. Working Cap., Sigma Blades.
1—Nettco Drive, Model WT 27, output speed 16.
1—Banbury Mixer #1.
1—Simpson #1 Intensive Mixer.
4—Baker Perkins Steel Jacketed Mixers, Sigma Blades, 100 Gals.
3—Baker Perkins Stainless Steel, Jacketed Mixers, Sigma Blades, 100 Gals.
3—Turbo Steel Jack. Mixers, 700 Gals. Each.
12—Simpson #0 Intensive Mixers "Unused".
1—Readco Stainless Steel Jacketed Double Arm Jacketed Mixer, Sigma Blades, 225 Gals.
1—Baker Perkins Stainless Steel Dispersion Mixer, Size 15, Type VUMM, 100 gals. working cap., 150 gals. total cap., 75 HP Drive.

PULVERIZERS—GRINDERS—MILLS

1—Mikro #2TH Stainless Steel Pulverizer.
1—Premier Stainless Steel Colloid Mill, Model UB-6.
1—Stewart Bolling 2-Roll Mill, 6"x12".
1—Mikro #3TH Mikro Pulverizer with 30 HP Motor.
1—Mikro #3W Pulverizer.
1—Mikro #2TH Pulverizer, Stainless Steel & Bronze Construction, with Motor.
1—Abbe #2 Master Rotary Cutter.
1—Ball & Jewell #0 S.S. Rotary Cutter.
2—Ball & Jewell #2 Rotary Cutters.
1—Blaw Knox Air Mill Pulverizer.
1—Mikro Stainless Steel Atomizer #6.
3—Thropp 2-Roll Rubber Mills, 18"x50".
1—Abbe #2 Buhrstone lined Pebble Mill, 5'x4'.
1—Gruendler #24-40 Hammer Mill.
1—Thropp 2-Roll Rubber Mill, 10"x24".
1—Sprout Waldron #36 Attrition Mill with 2-75 HP Motors.

AUTOCLAVES—KETTLES—TANKS

2—Glascote Glass Lined Jacketed Kettles, 10 & 20 Gals.
1—Pfaudler Glass Lined Jacketed Kettle, 20 Gals.
1—Monel Storage Tank, 1,300 Gals.
2—Blaw Knox Steel Jacketed Autoclaves. 300 & 500 Gals. Cap., P.S.I. Working Pressure 500 Lbs.
4—Buflovak Vacuum Shelf Dryers, 20 Shelves Each.
1—Buflovak Type 347 Stainless Steel Rotary Vacuum Dryer, 5' x 20' with all auxiliary equipment.
1—Bird 24" Monel Screen Type Centrifugal Filter.
1—Baker Perkins Stainless Steel Jacketed Double Arm Mixer, Sigma Blade, 9 Gal.
1—Combustion Engineering Stainless Steel Jacketed Autoclave, 500 Gal., 300 PSI.
1—Sweetland #2 Stainless Steel Filter, 12-16" Leaves, 28 Sq. Ft.
1—Patterson Steel Jacketed Autoclave, 900 Gals. Cap., Internal Pressure 120 Lbs.
1—Artesian Steel Jacketed Kettle, 1,000 Gals. Cap., with Rake Type Agitator, ASME Code, 50 Lbs. Pressure.
2—J. P. Devine Jacketed Vacuum Reactors, 2,000 Gals. Cap. Each.
1—Buffalo Steel Pressure Tank, 10,000 Gals. Cap. 125 PSI, ASME Coded.
25—Steel Storage Tanks, 9,000-17,500 Gals.
1—Steel Rubber Lined Storage Tank, 4,500 Gals. Cap.

MISCELLANEOUS

3—Downington Stainless Steel Heat Exchangers, 45 & 500 sq. ft.
1—Struthers Wells Hastelloy B Heat Exchangers, 450 sq. ft. "Unused".
1—Worthington Worthite Pump, with 7½ HP Motor, Model #3CT1A.
3—Nash Hytor Vacuum Pumps, Model #T8-12.
1—Ambaco Model 3A Heavy Duty Horizontal Continuous Baler.
1—Vulcan Copper Condenser, 300 sq. ft.
1—Dayton Dowd Centrifugal Pump, Stainless Steel, Size 1C8, 35 GPM at 40' head, speed 1745 RPM, 2"x1".
2—Worthington Antactron Centrifugal Pumps, Model #3 CU1, 4"x3".

Established 1886

R. GELB & SONS, Inc.,

CHEMICAL, RUBBER, OIL, PLASTIC and FOOD PROCESSING MACHINERY

STATE HIGHWAY No. 29, UNION, N. J. • UNionville 2-4900

PROFESSIONAL SERVICES

PATENTS · PLANT DESIGNS · RESEARCH
REPORTS · INVESTIGATIONS · MANAGEMENT
TESTING · GENERAL CONSULTING · TRANSLATIONS
CHEMICAL AND BACTERIOLOGICAL ANALYSIS

R. S. ARIES & ASSOCIATES
Chemical Engineers & Economists
COMMERCIAL CHEMICAL DEVELOPMENT
Process Analysis • Market Research
Surveys—Technical and Economic
Design & Initial Operation of Complete Plants
Licensing of New Processes & Products
New Product Development
480 Madison Ave. EL-5-1420 New York 17, N. Y.

W. L. BADGER
309 South State Street Ann Arbor, Mich
CONSULTING CHEMICAL ENGINEER
Evaporation, crystallization, and Heat Transfer; Complete plants for salt and caustic soda; Complete Dowtherm installations.

J. PAUL BISHOP AND ASSOCIATES
Consulting *Food and Chemical* *Engineers*
Specializing in:
Designing, Estimating and Engineering of New and Modernizing of Old Food and Chemical Plants and Processes.
Internationally Known
Write P.O. Box 348
Champaign Illinois

CARL DEMRICK
Technical Translations
Send for Circular
58 So. Broadway Yonkers, N. Y.

RICHARD F. ENNIS, JR.
Consulting Chemical Engineer
Engineering and Economic Studies
Design—Development—Research
Lincoln-Liberty Bldg. Philadelphia 7, Pa.

EVANS RESEARCH AND DEVELOPMENT CORPORATION
Organic and Inorganic Chemistry
Processes—Products
250 East 43rd St. New York 17, N. Y.

FRASER-BRACE ENGINEERING CO., INC.
Design Engineers & Constructors
of
Hydro-Electric Developments
Metallurgical, Explosives, & Industrial Plants
Chemical & Process Industries
Railroads—Tunnels—Port Facilities
10 East 40th St., New York 16, N. Y. Lex 2-5670

HALE AND KULLGREN, INC.
Specialists in Processes and Plants for Rubber and Plastics
A Complete Engineering Service including: Economic Surveys; Process Design; Installation; Contracting and Operation.
613 E. Tallmadge Ave. Akron 10, Ohio

TODAY more than ever before you must be sure before you proceed. The laboratories represented in this section offer you their facilities to help solve your analytical and testing problems—to help you get greater efficiency with lower costs and above all to help you to be sure.

KNOWLES ASSOCIATES
Chemical—Metallurgical—Mechanical Engineers
Consultation — Design
Complete Plants — Equipment
Heavy Chemicals — Ore Dressing
19 Rector Street New York 6, New York
Bowling Green 9-3456

KOHN & PECHENICK
Consulting Chemical Engineers
Plants — Process — Equipment
DESIGN
Reports Trouble-Shooting Appraisals
262 Huron St. Brooklyn 22, N. Y.

THE KULJIAN CORPORATION
Consultants • Engineers • Constructors
Chemical • Industrial • Process
1200 N. Broad St. Phila. 21, Pa.
Offices Throughout the World

CHAS. T. MAIN, INC.
Engineers
Industrial Plants
Reports Design Supervision
80 Federal Street Boston 10, Mass.
317 So. Tryon Street Charlotte, North Carolina

MARCO COMPANY, INC.
Researchers—Machine Designers—Consultants
Specializing in the development of continuous processing methods and special equipment for chemicals, food and other products.
Third and Church Streets, Wilmington 40, Delaware

C. L. MANTELL
Consulting Chemical Engineer
Process Research and Engineering
Development
487 Washington Street New York 13, N. Y.

JAMES P. O'DONNELL
Engineer
CHEMICAL AND PETROLEUM PROCESS PLANTS
Design-Procurement-Construction Supervision
Start-Up
39 Broadway, New York 6

PATCHEN AND ZIMMERMAN ENGINEERS
Chemical, Process, and Industrial Plants
Investigations—Reports—Design—Supervision
Augusta, Ga. Atlanta, Ga. Anniston, Ala.

GUSTAVE T. REICH
Consulting Chemical Engineer
DEVELOPMENTS — OPERATION
CARBOHYDRATES INDUSTRY
BY-PRODUCTS
CARBON-DIOXIDE — WASTE DISPOSAL
1423 Chestnut St. Philadelphia 2, Pa.

SANDERSON & PORTER
Engineers and Constructors
New York • Chicago • San Francisco

J. E. SIRRINE COMPANY
Engineers
Plant Design & Surveys covering Chemicals, Electrochemical and Metallurgical Production; Trade Waste Disposal; Water Supply & Treatment; Analyses & Reports.
Greenville - - - - - - - - - South Carolina

MARCUS SITTENFIELD
Consulting Chemical Engineer
Plants - DESIGN - Equipment
Economic - SURVEYS - Technical
Process - DEVELOPMENT - Product
Registered Professional Engineer
1411 Walnut St. Philadelphia 3, Pa.

FOSTER D. SNELL, INC.
Laboratory & Pilot Plant Projects
On Manufacturing of Inorganic and Organic Chemicals.
Plant and Design Equipment
Complete Line of Spray Dryers
Inquiries Invited
Engineering Advisory Services
29 West 15th St. New York 11, N. Y.
Phone WA-4-8800

THE J. G. WHITE ENGINEERING CORPORATION
Design - Construction - Reports - Appraisals
80 Broad Street, New York 4

ADVERTISERS INDEX

For more information about products of these advertisers, use Reader Service postcard in section following

Admiral Tool & Die Company, Inc....LT386
Aerofin Corporation 148
Air Preheater Corporation..... 354
Albert Pipe Supply Company.....B298
Aldrich Pump Company..... 71
Allen Bradley Company..... 52
Allis-Chalmers Mfg. 217, 237
Aluminum Co. of America..... 143
Amercoat Corporation 301
American Bitumuls & Asphalt Co.....L299
American Blower Corporation 64-65
American Brass Company 74
American Car & Foundry Co..... 259
American Hard Rubber Company..... 205
American Instrument Co., Inc.....B286
American Locomotive Company 336-337
American Mach. & Metals Inc., Tolhurst Div. 242
American Tool & Machine Co..... 289
Armstrong Machine Works..... 33
Atlas Mineral Products Co..... 144
Atlas Powder Company..... 38
Autoclave Engineers, Inc.....B284

Badger Mfg. Co..... 365
Bailey Meter Company 79
Bakelite Co. 61
Baker & Adamson Products, Gen. Chemical Div. of Allied Chem. & Dye Corporation 235
Baker & Company 156
Baker Perkins, Inc. 169
Barrett Div. of Allied Chem. & Dye Corp. 311
Bayley Blower Company LT390
Bechtel Corp. 62
Bell & Gossett Co. 227
Bemis Bro. Bag Company..... 341
Bethlehem Steel Company 87
Bin-Dicator Co., The T282
Bird Machine Company..... 11
Bishop & Co., J. Platinum Wks..... 387
Black, Sivalls & Bryson, Inc..... 220
Blickman Incorporated 256
Bridgeport Brass Co..... 80
Brown Boveri Corporation..... 397
Brown & Root Incorporated..... 115
Brush Electronics Co..... 292
Buffalo Forge Company 323
Buffalo Meter Company 221
Buffalo Pump Company 50
Buflovak Equip. Div. of Blaw Knox..... 15
Builders-Providence Inc. 99
Butler Mfg. Company 55

Cambridge Wire Cloth Company..... 258
Cameron Iron Works 363
Carbide & Carbon Chem. Corp..... 7
Carpenter Steel Company.....90, 392
Carrier Corporation 168
Catalytic Combustion Corp. T234
Ceilcote Co., The B123
Chapman Valve Mfg. Co..... 20
Chase Brass & Copper..... 88
Chemical Corp. 272
Chemical Construction Corp 94
Chemical & Power Products, Inc..... 408
Chemsteel Constr. Co., Inc..... 409
Chicago Bridge & Iron..... 389
Chicago Pneumatic Tool Company..... 60
Childers Mfg. Co. 10
Cleaver Brooks Company..... 91
Cleveland Mixer Co., The..... 409
R. D. Cole Mfg. Company.....B300
Corning Glass Works 27
Cooper Bessemer Corp. 23
Cowles Company L393
Crane Company 213, 243
Crane Packing Company 150
Crucible Steel Co. of America..... 352
Cuno Eng. Corp. 24
Cyclotherm Steam Generators.....B282

Darco Dept. Atlas Powder Co..... 70
Darling Valve & Mfg. Co..... 306
Davenport Machine & Foundry Co.....B145
Davis Regulator Company.....LB390
Davison Chemical Corp., The..... 81
Day Company, The 293
J. H. Day Company..... 313
DeLaval Separator Company 164
DeLaval Steam Turbine Company.....318½
Deming Company 141
Dezurik Shower Co.....L355
Diamond Power Specialty Corp.....R307
Dicalite Div. Gt. Lakes Carbon Corp.... 28
Dings Magnetic Separator Co..... 43
Dorr Company 260-261

ADVERTISING STAFF

Sales Manager — **B. E. Sawyer**
Business Manager — **A. J. Mangold**

Sales Representatives

Atlanta.....**R. H. Sidur**
Boston.....**W. D. Boyd**
Chicago.....**L. A. Cunningham**
Chicago.....**J. M. Rodger, Jr.**
Cleveland.....**R. W. Davis**
Cleveland.....**D. G. Sawyer**
Dallas.....**J. H. Cash**
Detroit.....**D. G. Sawyer**
Los Angeles.....**J. H. Allen**
New York.....**R. G. Frederick**
New York.....**J. E. Tuohig**
Philadelphia....**E. M. Schellenger**
Pittsburg.....**R. W. Davis**
San Francisco.....**Ralph Dorland**
St. Louis.....**J. M. Rodger, Jr.**

Dowell Incorporated 219
Downingtown Iron Works Inc.....T284
Dracco Corporation 125
E. I. duPont de Nemours.....47, 160
Duriron Company, Inc..... 265
Dust Suppression & Eng. Co.....MT408

Eagle-Picher Co., The..... 339
Eastern Industries, Inc. 254
Eastman-Kodak Company 51
Eaton Dikeman Company.....B140
Electric Steel Foundry Co.....R355
Entoleter Div. of The Safety Car Heating & Lighting Co., Inc. T312
Elliott Company 39, 277, 351
Enjay Company, Inc. 53
Esso Standard Oil Co..... 368

Fairbanks-Morse Company..... 68
Falk Corp., The 72
Fansteel Mat. Corp. 139
Farris Flexible Valve Corp..... 54
Fisher Governor Company..... 86
Fletcher Works B138
Foote Bros. Gear & Machine Corp..... 367
Forty-Eight Insulations, Inc..... 290
Foxboro Company 267
Friez Instu. Div. of Bendix-Aviation Corporation B234
Fruehauf Trailer Co. 271
Fuller Company 360
Fulton Sylphon Company 129
Garlock Packing Company R278
Gas Atmospheres, Inc. 295
General Amer. Transp. Corp.....117, 209
General Chem. Div. Allied Chem. & Dye Corp. 107
General Electric Co...37, 84, 324-325, 384-385
The Girdler Corporation .....2nd Cover
Globe Steel Tubes Company..... 42
Glycerine Producers Assoc..... 247
Goodrich Chemical Co., B. F..... 9
Goodyear-Tire & Rubber Co., Inc..... 19
Graphite Metalizing Corp..... 322
Graver Tank & Mfg. Co., Inc..... 362
Grinnell Company, Inc..... 8

Hagan Corporation 378-379
Hammel Dahl Company..... 6
Harbison-Walker Refractories Co..... 97
Hardinge Company, Inc..... 314
Harper Co., H. M., The..... 364
Hassall, John, Inc.....T288
Haveg Corporation 357
Haynes Stellite Div. Union Carbide & Carbon Corp. 211
Helicoid Gage Div. of American Chain & Cable 297
Heyden Chemical Corporation 233
Hills McCanna Company 330
Hooker Electrochemical Co. 59
Hydrocarbon Research, Inc. 78

Illinois Water Treatment Co..... 132
Illinois Testing Labs Inc.....R350
Industrial Filter & Pump Mfg. Co..... 333
Infilco Inc. R299
Ingersoll-Rand Company..... 349
International Engrg. Inc. 147
International Nickel Co. 32, 159
International Paper Co. 353
I.T.E. Circuit Breaker Co.....104-105

Jackson & Church Co..... 329
Jeffrey Mfg. Company 66
Jelliff Mfg. Corp., The C. O.....B142
Jenkins Brothers 34
Johns-Manville 231, 308, 380

Kaiser Engineers Div. of Henry J. Kaiser Co. 318-319
Keasbey & Mattison Co..... 381
Kelley & Co., O. G. 26
Kellog Co., M. W..... 372
Kemp Mfg. Company..... 46
Kidde & Co., Walter..... 232
Kinney Mfg. Co. L408
Kirk & Blum Mfg. Co. 151
Kold-Hold Mfg. 253
Koppers Co., Inc.....155, 332, 382

LaBour Co., Inc..... 73
Laminex Corp. 274
Lapp Insulator Co., Inc.....67, 163
Leeds & Northrup Co..... 376
Lee Metal Products Co.....B134
Link Belt Co.....13, 347, 374
Liquidometer Corp. B312
Lukens Steel Co. 95, 394

Magna Mfg. Co., Inc..... 409
Mahon & Company, R. C..... 158
Manheim Mfg. & Belting Co..... 96
Master Electric Company.....3rd Cover
Mathieson Chemical Co..... 109
McDanel Refractory Porcelain Co.....L388
Meriam Instrument Co..... 126
Merrick Scale Mfg. Co..... 409

Metal Welding 409
Michigan Pipe Co. 320
Midvale Co., The 82
Midwest Piping Co., Inc. 29
Minneapolis-Honeywell Reg. Co., Industrial Division 30-31, 121
Mixing Equipment Co., Inc. 119
Mojonnier Bros. Co. 316
Morris Machine Works 128
Multi-Metal Wire Cloth Co., Inc. T134
Mundet Cork Corporation T142

Nagle Pumps Inc. RT388
Nash Engineering Co. 98
National Aluminate Corp. 223
National Carbon Co. 263
National Engineering Co. 137
National Filter Media Corp. R393
National Lead Co. 215
National Research Corp. 391
Neptune Meter Co. 216
Neville Co., The 356
Niagara Alkali Co. 21
Niagara Blower Co. 131
Nichols Engineering & Research Corp. T123
Nicholson & Co., W. H. B127
Nordstrom Valves Div. of Rockwell Mfg. Co. 56-57
Norton Co. 359

Ohio Steel Foundry L350

Phila Quartz Co. L409
Pacific Pumps Inc. 366
Pangborn Corp. 257
Parker Appliance Co. 17
Patterson-Kelly Co., The Inc. 399
Peerless Mfg. Co. T138
Peerless Pump Div., Food Machy. & Chemical Corp. 369
Penn. Flex. Metallic Tubing Co. 400
Penn. Ind. Chem. Corp. 44
Pfaudler Co. ..... Back Cover
Pfizer & Co., Inc., Chas. 269
Phila. Gear Works 22
Pitts. Coke & Chem. Co. 83
Pitts. Lectrodryer Corp. 383
Powell Co., Wm. 152-153
Powers Reg. Co. 166
Pressed Steel Co. B288
Pressed Steel Tank Co. 396
Process Controls, Div. of Baird Associates 122
Proctor & Schwartz Inc. 398
Proportioneers, Inc. 103
Pyrene Mfg. Co. 225

Quaker Oats Co., Chemicals Dept. 278

Raybestos-Manhattan, Inc., Manhattan Rubber Div. 361
Raymond Pulverizing Div., Combustion Engrg. Inc. 244
Reading, Pratt & Cady Div. of Amer. Chain & Cable 285
Reeves Pulley Co. 226
Rem-Cru Titanium Inc. 58
Republic Steel Corp. 85, 371
Revere Copper & Brass Inc. 12
Reynolds Metals Co. 275
Richardson Scale Co. 402
Ric-Wil Company B130
Rietz Mfg. Co. RB388
Roots-Connersville Blower Corp. 296
Roper Corp., Geo. D. 222
R-S Products Corporation 401
Ryerson & Son, Inc., J. T. 170

Saran Lined Pipe Co. 252
Schneible Co., Claude B. T140
Schutte & Koerting Co. 251
Servel Incorporated 375
Sharples Corporation 373
Shell Chemical Corp. 113
Shriver & Co., T. T145
Simpson Mix-Muller Div. 137
Sly Mfg. Co., The W. W. 224
Smith, A. O. 149
Snap-On Tools Corporation 310
Solvay Process Div. Allied Chem. & Dye Corporation 236
Sparkler Mfg. Co. 248-249
Spence Engineering Co., Inc. 406
Sperry & Co., D. R. 16
Spraying Systems Co. T130
Sprout Waldron Co. 317
Standard Conveyor Co. T286
Standard Oil Co. 358
Standard Steel Corp. 250
Stanley Co., Inc., Wm. W. LB307
Stearns Magnetic, Inc. 304
Stokes Machine Co., F. J. 371
Struthers-Wells Corp. 89
Sturtevant Mill Co. 18
Sun Oil Company 280
Superior Combustion Industries R390
Superior Electric Company 404
Surface Combustion Corporation 302-303
Sutton Steele & Steele Inc. L278
Swenson Evaporator Co. 255

Taber Pump Company 321
Tank Car Div., Gen. Amer. Trans. Corp. 117
Taylor & Co., W. A. R386
Taylor Instruments Co. 76-77
Terry Steam Turbine Co., The 403
Texas Gulf Sulphur Co. 377
Troit Mfg. Co. T298
Traylor-Engrg. & Mfg. Co. 63
Treadwell Const. Co. 279
Trent Tube Company 287
Tri-Clover Machine Co. 75

United Chromium Inc. 335
Union Carbide & Carbon Corp. 7
U. S. Gasket Co. 294
U. S. I. Chemicals Co. 35-36
U. S. Rubber Co. 273, 331
U. S. Steel Corp. 92-93
U. S. Steel Products Div. of U. S. Steel Corp. 327
U. S. Stoneware Co. 100

Vernon Tool Co., Ltd. LT307
Virginia Smelting Co. 305
Vogt Machine Co., Henry 405

Wagner Electric Corporation 154
Watson-Stillman Fittings Div. of H. K. Porter Co., Inc. 343
Walworth Co. 14
Waukesha Foundry Co. 45
Welsbach Corp., The 345
Westinghouse Electric Corp. 40-41, 48-49, 69, 315
Westinghouse Elec. Corp., Sturtevant Div. 407
Weston Elec'l. Instr. Co. 340
Wiegand Co., Edwin 283
Wiggins Gasholder Div. of Gen. Amer. Transp. Corp. 209
Wilfley & Sons, A. R. 291
Williams Patent Crusher & Pulverizer Company 155
L. J. Wing Mfg. Co. 328
Willson Products, Inc. 162
Wolverine Tube Division of Calumet & Copper Co. 25
Worthington Corp. 161, 165, 167
Wyandotte Chemicals Corp. 157
Wyssmont Co. T127

Yarnall-Waring Co. T300
York Corp. 395

PROFESSIONAL SERVICES 412

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant 410, 412
Selling Opportunities Offered 412
Positions Wanted 412
Selling Opportunities Wanted 412
Employment Services 412

SPECIAL SERVICES
Contract Work 412

BUSINESS OPPORTUNITIES
Offered 412

PROPERTY
For Sale 412
Wanted 412

EQUIPMENT
(Used or Surplus New)
For Sale 412-421

WANTED
Equipment 412
Miscellaneous 412

ADVERTISERS INDEX

Aaron Equipment Co. 420
American Air Compressor Corp. 418
American Technion Society 410
Anchor Supply Co. 418

Barcan Co., Irving 414
Bohn Aluminum & Brass Corp. 412
Booty Resineers, Inc. 420
Brill Equipment Co. 415

Celanese Corp. of America 410
Chemical & Process Machinery Corp. 418
Chemical Service Corp. 412
Consolidated Products Co., Inc. 411

Diamond Alkali Co. 410
Dalton Supply Co. 416, 418
Drake Personnel Inc. 412

Electric Equipment Co. 420
Equipment Clearing House Inc. 416

First Machinery Corp. 417

Gelb & Son Inc., R. 412, 421

Heat & Power Co., Inc. 416
Heineken Inc., W. P. 417

Kehoe Machinery Corp. 416

Lawler Company 416
Lestan Corp. 420
Loeb Equipment Supply Co. 420
Loeb & Son, H. 418
Luria Steel & Trading Corp., Erman-Howell Division 419

Machinery & Equipment Corp. 417
Mennen Co., The 412
Meyer & Sons Inc., Wm. W. 419

Newman Tallow & Soap Machinery Co. 416

O'Neill, A. J. 414

Pangborn Corp. 410
Pennsylvania Salt & Mfg. Co. of Wash. 418
Perry Equipment Corp. 413, 418

Southwest Metal Co. 414
Stanhope Inc., R. C. 417
Stein Equipment Co. 414
Strickler & Assoc., Dean C. 416

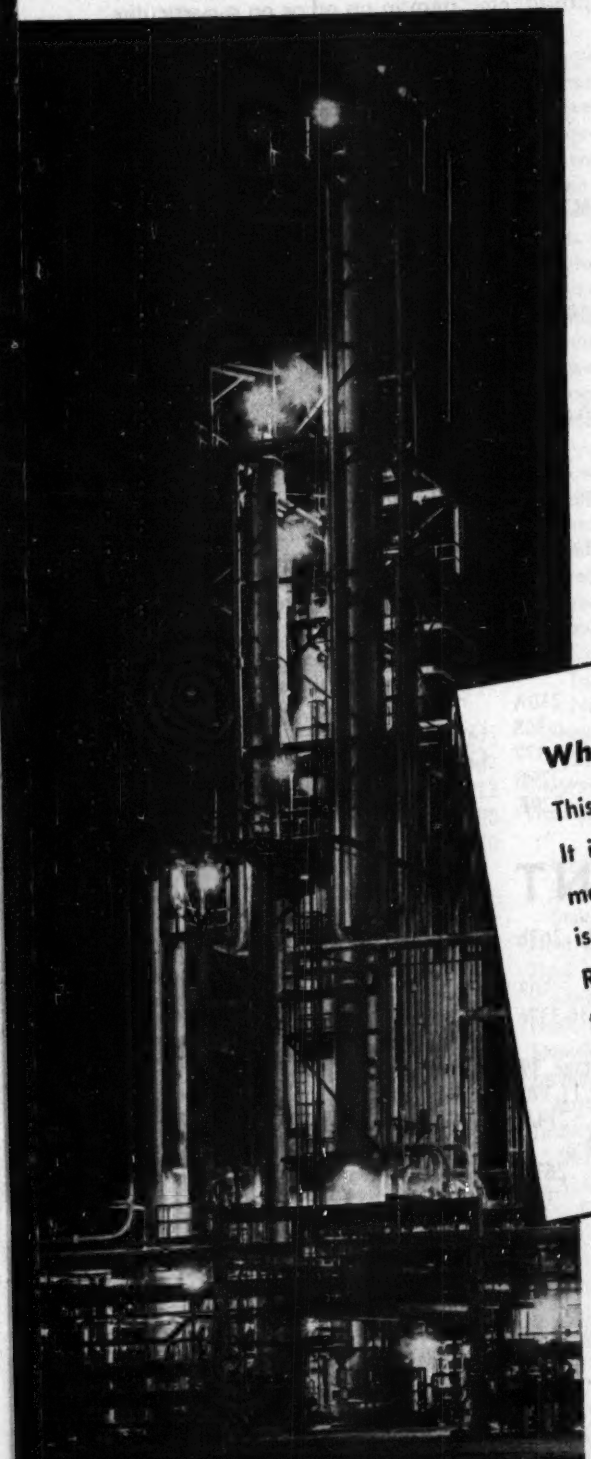
Truland Chemical & Engineering Co. 412

Union Standard Equipment Co. 414
United Iron & Metal Co., Machinery & Steel Division 419

Vulcan Detinning Co., The 420

Windemere Sales Co. 418

Chemical Engineering Reader Service



- **CHEMICALS**
- **EQUIPMENT**
- **SERVICES**

What Reader Service Does for You

This department can serve you in three ways. It is a complete classified directory to equipment, chemicals and services offered in this issue of Chemical Engineering. It is a key to the Reader Service postcards (inside back cover) that will bring you free additional information on any of the listed items. You can also use the Reader Service postcards to order reprints of Chemical Engineering reports and articles.

Chemical Engineering Reader Service

How Reader Service Works

The Reader Service postcard inside the back cover makes it easy to get more information on any of the chemicals, equipment or services listed here. The card has corresponding numbers for each of the key page numbers in this directory. Circle the numbers of the items you want; fill out the return address; mail the card to us. Answers will come direct to you from the companies. The letters, L, R, T, B, locate ads on the page: left, right, top, bottom. The letters a, b, c and A, B, C indicate first, second, third, etc., item in an ad or on a particular page.

CHEMICALS

Acrylic fiber 320N
Adhesive 322R
Alkalies 236
Alkyd resins, for controlling paint consistency 35
Aluminum sulfate 235
Aluminum trihydrate, organic free 275
Ammonium thiocyanate 322G
Animal feed supplement 230C
Carbon, activated 70
Carbonate of potash 21
Catalysts 81a
Caustic soda 59
Cellulose polymer 228A
Chemicals 322L
  Glass making 109
Coal chemicals 83
Coatings, protective 229C
  Neoprene 228B
  Vinyl resin & plasticizer compound 335
Concrete substitute 229D
Detergents 322I
Detergent promoter 157
Dispersing agents 229A, 232A
Dyestuffs 234B
Epichlorohydrin 113
Ethylene oxide 7, 318E
Ferrocyanides 320M
Flotation agents 320C
Furfuryl alcohol 276
Glucosotes 321H
Glycerine, for alkyd resins & ester gums 247
Heat transfer oil, heavy 280
Hydrofluoric acid, anhydrous & aqueous 107
Hydrogel, for inducing microporosity 81b
Insecticides 234A, 320I
Ion exchange resins 223
Isotopes 321I
Lacquer emulsions 321C
Molybdenum disulfide 318B
Napthalene derivatives 234C
N-phenylmaleamic 318N
Olefins 53
Ozone 345b
Peroxygen 318L
Phthalic anhydride 311
Plastics 320A
Plasticizers 228C, 320R
Polyols
  Pentaerythritol 233
  Sorbitol 38
Polyvinyl materials, resin, plastic granules or Latex 9
Pyridine bases 318Q
Reducing agents 305
Resins 320-O, 356
  Equipment 320K
  Paracoumarone-indene 44
  For protective coating formulations 61
  Styrene—for coating, bulletin C-3-177 135
Silicates of soda 409
Sizing agents 232B
Soil conditioners 230B
Solvents
  High boiling 230A
  Petroleum 368
Sulphur 377
Vinyl plasticizer 229B
Weld-backing 229E

EQUIPMENT

Absorbers, HCl, catalog S-7460 .. 263h
Air conditioning, humidity control 303
Air Coolers 336-337c
Air handling equipment
  Blowers, centrifugal, single stage . 39
  Fans & Blowers TL390
Alarm, fire 214A
Anodes, graphite ground, catalog section S-6510 ..... 263d
Bearings, oilless, submerged 322
Belts,
  Conveyor 361
  V, adjustable 96
Buckets, molded fiberglass 274
Building sheets, asbestos cement, corrugated 380
Buildings, pre-fabricated 55
Burners, industrial, general line Bulletin 2-GE-8 302
Calcinators, multiple hearth ... T123a
Caps & risers, bulletin 21 ..... B288
  Corrosion & heat resistant 82c
  Steel 322O
Cement, furane resin 144
Centrifugals 164, B138
  Center slung 242
Centrifuges 289
Chain, roller, steel 347
Chillers, water 375
Cleaners, vacuum 214B
Cleaning equipment 207D
Clothing, industrial, hats, safety .. 162
Combustion chambers, HCl ... 263g
Comparators 386
Compression stills 91
Compressors 167, 318P
  Centrifugal, single-stage, bulletin 109 64-65
  Motor driven 23
  Refrigeration, freon 165
  Type Y, bulletin 766 60
Condensers 372c
Containers—Bags
  Multiwall 210E, 341, 353
  Seamless jute 210A
  Cans, transport, aluminum ... R408
  Drums, steel 327
Controlled humidity, air conditioning method 131
Conveyors 320H, 320L
  Air, bulk handling 360
  Belt 374
  Gravity, bulletin No. 63-B .. T286a
  Natural frequency 212C
  Pneumatic, bulletin 529 125
  Power T286b
Conveyor-feeder-elevator unit, book 2475 13
Coolers
  Cascade
    Impervious graphite 263f
    Pyrex 27
  Rotary 63b
Crane suspension 210C
Cylinders, gas, compressed, seamless 396

Defractories, insulating, brick.....97
Dehydrators, crystal 373
Demineralizers 333b
Diatomaceous materials 28
Disintegration equipment
Crushers 66a
Gyratory, primary 63c
Gyratory, secondary 63d
Jam 63f
Disintegrators BR388
Mills
Ball 63e
Boring 336-337b
Drying, grinding 314
Hammer 155
Pulverizers 66b
Micron-size 18
Shredders 66c
Drawing reproduction materials, autopositive 51
Drives
Helical, enclosed 367a
Power 433
Variable speed 226
Worm gear 367b
Drums, magnetic 212E
Dryers
Air, with activated alumina....383
Oriad, bulletin D-27 46
Rotary, bulletin 531.....250
Spray 255
Turbo T127
Drying equipment, spray.....398b
Drying systems, flash, catalog No. 54A 244
Dust collectors
Centrifugal M408, T298
Cloth flat bag.....224
Cloth flat tube, bulletin 909A..257
Cloth tube, blow ring, bulletin 528 293
Electric precipitation 407
Filter, suction T312
Water wash 158
Water wash bulletin 551....T140
Ejectors
Hydro 372b
Steam jet 351
Electroplating supplies 322O
Engine, one man fire.....216B
Evaporators 318M
Flex-tube 336-337d
Low temperature 316
Extinguishers, fire 216A
Fabricators
Pipe coils, catalog No. 53....213
Piping 8
Platinum 387
Processing machinery 398a
Pumps 366
Towers & vessels, alloys & aluminum 362
Fans
Cooling tower 332
Industrial exhauster 323
Fastenings, corrosion resistant...364
Feeders
Apron 63g
Dry solids 212B
Filters 318R, 248
Centrifugal, continuous 11
Horizontal plate 249
Pressure 333a
Wire wound, self cleaning.....24
Filter aids, celite 231
Filter cloth, Orlon 47
Filter fabrics, cotton & synthetic BL307
Filter papers B140, R393
Fire extinguishing systems.....232
Fire protection equipment.....225
Fittings
Forged steel 343
Saran lined 252c
Welding, catalog 48.....29
Flakers and cooling drums, catalog 352 15
Flanges, rubber lined pipe.....208D
Flooring
Asphalt 318I
Iron-asphalt 321M
Forgings and rings 82a
Furnaces, electric, arc, equipment for 40-41
Fuses, short-circuit 207C
Gasholders 209
Gaskets, plastic & gasketing materials 294
Gearmotors, vertical & horizontal 367c
Generators—Gas
Carbon dioxide 295a
Inert 295c
Nitrogen 295b
Steam R390, B282
Induced draft 405
Glass apparatus 321O
Heat exchangers....148, 149, T284a, 336-337a
Haveg, standard pressure.....357
Shell & tube 263b
Stainless steel 372a
Heat transfer apparatus 2
Heat transfer equipment.....T284b
Coils, platecoils, bulletin P61..253
Hose, metal 322J
Icemakers, automatic 395
Incinerators, fume, catalytic combustion T234
Instruments
Analysis, X-ray 318J
Analyzers
Flow 79b
Gas, infrared 376
Automatic titrator 321P
Computer 226A
Controls
Automatic 378-379a
Level 225A
Liquid level 218A, 221C
Non-conductor levels.....221A
Relays 322H
Rotameters, purge 251
Viscosity 320D
Voltage 404
Controllers 267
Flow 79c
Plug-in 76-77a
Pressure 86
Deceivers, plug-in 76-77b
Detectors
Electronic 321A
Electrostatic charges 221B
Flame photometry 322B
Flometer 220A
Guages 321R
Pressure 126
Pressure & vacuum 297
Tank, liquid level.....B312
Indicators, viscometer 223B
Laboratory 321F
Laboratory equipment 322F
Level indicator T282
Flow 79a, 216, 225B
Automatic 221
Ring balance 378-379b
Meters
Mass flow 224A
Positive displacement, bulletin M-152 296
Propeller type, bulletin 380-K4 99
Thermometer 322N
Velocity, bulletin 2448-6..R350
Meter flow and level 222A
Oscillographs 292
Panels, graphic, centralized...30-31
Plant stream analyzers 122
Pyrometers 84
Recorder, speed 222B
Regulators
Temperature 166
Safety type, bulletin N6-D.129
Spectrophotometers B284
Thermistors B234
Thermometers, all-metal.....340
Transmitters, pressure 223A
Insulation
Asphalt base, spray L299
Cement 339
85% Magnesia 381
Thermal 308
Insulation blankets, bulletin 511..290
Insulation material T142
Ion exchangers 132b
Jacketing, weatherproof, aluminum 10
Kettles, corrosion resistant.....B134
Kilns, rotary, bulletin 115.....63a
Kiln ends, air-cooled.....237
Linings
Brick, catalog section S-6210..263e

Brick, porcelain L-388
Protective, hard rubber 331
Rubber 321G
Lining and covering
Resilient sheet rubber 19
Rubber 333c
Loaders, box car 210G
Manifolds 322E
Materials handling equipment 318K, 321L, 322C
Aluminum 321J
Materials of construction
Alloys, nickel base, corrosion resistant 211
Lead sheets 215
Nickel 318D
Nickel & nickel alloys 159
Steels
Clad 394
Stainless 85, 90, 92-93S 322S, 352
Teflon 320B
Titanium 58, 318H
Mixing equipment
Blenders, twin shell 399
Dissolvers L393
Mixers 254
Blenders 317b
Continuous & batch 317a
Chemical 161
Laboratory, catalog DH-50 .119a
Mixing & Kneading mach ... 169
Mullers 137
Pony type 313
Portable, electric & air driven catalog B-75 ..... 119b
Side entering, catalog B104, 119e
Top entering, propeller type, catalog B-103 ..... 119d
Top entering, turbine & paddle types, catalog B-102 .. 119c
Variable speeds 147
Motors, electric
Explosion proof 48-49
Polyphase 154b
Single phase 154a
Synchronous 277
TEFC 217
TEFC, bulletin GEA-4400 37
Motor controls, solenoid 52
Motor reducers, all motor type, bulletin 3104 72
Motor units, for valve & sluice gate control, catalog No. 50 20
Nozzles, spray, catalog 22, 23 ... T130
O-rings, synthetic rubber 17
Ovens, far-infrared 283
Ozonators 345a
Packaging equipment
Automatic 322K
Bags, polyethylene 322A
Steel strappings 321N
Packings
Saddles, chemical porcelain 100
Shaft & rod, asbestos brick, with Teflon R278
Teflon 150
Piezo-electric materials 321Q
Pile, shells and fittings B298d
Pilot plant equipment T123c
Pipe
Corrosion resistant B130a
Fittings and valves, catalog section S-7000 ..... 263a
Insulated B130c
Polyvinyl chlor. thermoplastic . 320E
Porcelain 67b
Prefabricated B130b, B298c
Saran rubber lined 252a
Steel 336-337e
Saran-rubber lined 320b
Wood-lined 320a
Pipe systems B298b
Pipe and accessories B298a
Pipe and fittings 318F
Copper 74
Pipe and tubing, stainless 170
Platforms, adjustable 212D
Porous mediums 368b
Power systems, distribution, high voltage load center 324-325
Precipitators, electrostatic 382
Preheaters, air, Ljungstrom 354
Presses
Continuous B145
Filter 16
Pulp 329
Process equipment 320Q, 321B
Catalog 406-D B286b
Corrosion resistant 256
Glassed steel, bulletin 894-F-1 .. 434
Lead bonded 26
Special shapes, porcelain 67d
Vacuum 371
Pullers, plug, bar-type L350
Pumps 50, 3180, 321K
Acid 291
Centrifugal 128b, 227
Catalog 250 75
Catalog section S-7200 ..... 263c
Chemical 71
Chemical proportioning bulletin 4061-D B286a
Controlled volume 163
Diaphragm, bulletin 137 ..... T145
For abrasives & corrosives .. TR388
High pressure 141
High vacuum 320G
Horizontal, split-case, sin. stage . 369
Liquor 348
Metering & proportioning 330
Multi-stage 349
Processing, bulletin V-837 321
Proportioning, bulletin 1105 ... 103
Rotary, catalog 953 222
Rotary, pos. displacement L408
Sanitary, positive displacement .. 45
Self-priming, centrifugal 73
Series R, bulletin P/1 265
Slurry bulletin 181 ..... 128a
Volume, angle flow 68
Purifiers, gas 156
Pusher, fork truck 212A
Ramp, car loading 210F
Rectifiers, mechanical ... 104-105, 397
Reducers, speed 322D
Worm gear 22
Refrigerating mach., reciprocating . 168
Regenerators 337f
Roasters, multiple hearth T123b
Rolls
Jacketed steel 95
Steel, hardened & ground 82b
Safety equipment 322P, 321D
Scales, automatic 402
Scales, automatic, continuous weighing 322M
Scraper, rotary 210D
Screws, nails, rivets T288
Separators T138
Magnetic 43, 304
Specific gravity, lab size L278
Sequestering agents, citrates & gluconates 269
Skid, stacking 210B
Stacks, fume, resin-bonded glass fiber 272
Storage systems 320I
Strainers
Basket type BL390
Self-cleaning 208E
Wire screen, bulletin S-203 .. T-300
Surfacing mat., corrosion proof .. B123
Switch, safety 207A
Switchgear, low voltage, booklet B-5282 315
Tanks
Mixer 208C
Storage, gas B300
Storage, Hortonspheres 389
Trailers 271
Tantallum 139
Towers
Porcelain 67c
Section S-7350 ..... 263i
Traps
Magnetic, pipeline 32
Steam
Bulletin 152 ..... B127a
High pressure floats B127b
Side inlet-side outlet 33
Trucks, fork-lift 210H
Tubes
Air 318G
Condenser
Copper alloy 12
Copper & copper alloy 25
Condenser & heat exchanger, copper & copper alloy 80
Porous, seamless 354a
Pressure, bulletin CEC-53 370
Stainless steel 42
Water, copper 88

Tubing
Coiled, aluminum 143
Flexible, metallic 400
Stainless steel 287

Turbines
Free piston 206A
General purpose, Type E.....69
Mechanical drive, bulletin GEA-4955A 384-385
Steam, solid wheel, bulletin S-116 403
Valves 318A, 322T
Cast steel, small 14
Control 6, 401
Proportional, bulletin 700-2..121
Diaphragm
Motor operated, catalog No. FL382-A 54
Plastic 205
Gate
Aluminum 152-153a
Forged steel 285
Iron wedge 243
Revolving disc 306
General line 34
Globe, aluminum 152-153b
Lift-plug, non-lubricated 363
Lubricant-sealed 56-57
Plug L355, 259
Polyethylene 208B
Porcelain 67a
Regulating, packless 406
Rising stem, with liquid level guage 152-153c
Saran lined 252b
Sight feed, square glass...152-153d
Steel TL-307
Swing check, stainless steel 152-153c
Throttling 208A
"Y" 152-153f
Valve-vent, flame arrester, bulletin E-601 220
Vessels
Pressure 82d
Process, with agitator drive....89
Water treatment
Demineralizers 132a
Ion exchange 318C
Wire cloth 258
Wire mesh B142
Wire and cable 320P
Electrical 273
Wire and filter cloth, leaves, screens T-134
Wired Television, "Utiliscope".R307
Wireway 207B
Wrench, impact, electric.....310

SERVICES

Bulk liquid transportation, tank car 117
Consultants 320F
Research 321E
Custom roasting T123e
Dust and fume control 151
Engineering services T123d
Engineering & construction 318
Plants, tonnage, oxygen & nitrogen 788
process plants.....62, 94, 115, 319
Maintenance cleaning, with chemicals 219

Use This Handy Postcard to Help You in Keeping Up-to-Date

Page numbers & key letters—Circle what you want, fill in reverse side, tear out and mail

. . . These items in this issue as circled below: **(Card expires October 1)**

2	33	63b	79c	113	B130c	152–153c	208B	218A	229C	252a	275	295a	313	320a	321F	322M	340	367b	389
6	34	63c	80	115	131	152–153d	208C	219	229D	252b	276	295b	314	320b	321G	322N	341	367c	TL390
7	35	63d	81a	117	132a	152–153e	208D	220	229E	252c	277	295c	315	320A	321H	322O	343	388	BL390
8	37	63e	81b	119a	132b	152–153f	208E	220A	230A	253	L278	296	316	320B	321I	322P	345a	389	R390
9	38	63f	82a	119b	T134	154a	209	221	230B	254	R278	297	317a	320C	321J	322Q	345b	370	L393
10	39	63g	82b	119c	B134	154b	210A	221A	230C	255	280	T298	317b	320D	321K	322R	347	371	R393
11	40–41	64–65	82c	119d	135	155	210B	221B	231	256	T282	B298a	318	320E	321L	322S	348	372a	394
12	42	66a	82d	119e	137	156	210C	221C	232	257	B282	B298b	318A	320F	321M	322T	349	372b	395
13	43	66b	83	121	T138	157	210D	222	232A	258	283	B298c	318B	320G	321N	323	L350	372c	396
14	44	66c	84	122	B138	158	210E	222A	232B	259	T284a	R298d	318C	320H	321O	324–325	R350	373	397
15	45	67a	85	T123a	139	161	210F	222B	233	263a	T284b	L299	318D	320I	321P	327	351	374	398a
16	46	67b	86	T123b	T140	162	210G	223	T234	263b	B284	T300	318E	320J	321Q	329	352	375	398b
17	47	67c	88	T123c	B140	163	210H	223A	B234	263c	285	B300	318F	320K	321R	330	353	376	399
18	48–49	67d	89	T123d	141	164	211	223B	234A	263d	T286a	302	318G	320L	322	331	354	377	400
19	50	68	90	B123	T142	165	212A	224	234B	263e	T286b	303	318H	320M	322A	332	L355	378–379a	401
20	51	69	91	125	B142	166	212B	224A	234C	263f	B286a	304	318I	320N	322B	333a	356	378–379b	402
21	52	70	92–93	126	143	167	212C	225	235	263g	B286b	305	318J	320O	322C	333b	357	380	403
22	53	71	94	T127	144	168	212D	225A	236	263h	287	306	318K	320P	322D	333c	359a	381	404
23	54	72	95	B127a	T145	169	212E	225B	237	263i	T288	TL307	318L	320Q	322E	335	359b	382	405
24	55	73	96	B127b	B145	170	213	226	242	265	B288	BL307	318M	320R	322F	336–337a	360	383	408
25	56–57	74	97	B127c	147	205	214A	226A	243	267	289	R307	318N	321	322G	336–337b	361	384–385	407
26	58	75	99	128a	148	206A	214B	227	244	269	290	308	318O	321A	322H	336–337c	362	386	L408
27	59	76–77a	100	128b	149	207A	215	228A	247	271	291	310	318P	321B	322I	336–337d	363	387	R408
28	60	76–77b	103	129	150	207B	216	228B	248	272	292	311	318Q	321C	322J	336–337e	364	L388	409
29	61	78	104–105	T130	151	207C	216A	228C	249	273	293	T312	318R	321D	322K	336–337f	366	TR388	433
30–31	62	79a	107	B130a	152–153a	207D	216B	229A	250	274	294	B312	319	321E	322L	339	367a	BR388	434
32	63a	79b	109	B130b	152–153b	208A	217	229B	251										

. . . And these items in the Reader Service "Flashback" Section (p. 430)

250A	254D	258B	261C	265A	268B	271B	272D	278C	348F	348M	350C	350J	350Q	352C	352I	352O	354C	354I	354O
251A	254E	258C	261D	265B	268C	271C	274A	278D	348G	348N	350D	350K	350R	352D	352J	352P	354D	354J	354P
251B	254F	258D	261E	266A	268D	271D	274B	348A	348H	348O	350E	350L	350S	352E	352K	352Q	354E	354K	354Q
252A	254G	260A	262A	266B	268E	271E	276A	348B	348I	348P	350F	350M	350T	352F	352L	352R	354F	354L	354R
254A	254H	260B	262B	267A	268F	272A	276B	348C	348J	348Q	350G	350N	352A	352G	352M	354A	354G	354M	354S
254B	256A	261A	262C	267B	270A	272B	278A	348D	348K	350A	350H	350O	352B	352H	352N	354B	354H	354N	354T
254C	258A	261B	264A	268A	271A	272C	278B	348E	348L	350B	3501	350P							

. . . Send me these reprints, I will remit on receipt. (See last Reader Service page for description.)

1 2 3 6 11 14 15 17 18 19 20 22 22a 22b 25 26 27 29 31 32 33 34

Flashback . . .

To make sure that you don't miss any news that could help you with your job, Chemical Engineering is doing a double take for you. The listings on this and the following page is a repeat of the editorial listings only on chemicals, equipment and services featured last month in the New Equipment, New Products and New Technical Literature departments. Use the postcard below for more information on any item in this list.

CHEMICALS

Acrylic dispersion 271B
Asphaltic waterproofing material....272A
Asphalt paint 278B
Atoms 350I
Bromine carrier 271E
Carbon black 350C
Chlorosulfonic acid 354L
Cleaning solutions 350H
Detergents
  In fertilizer manufacture.....354A
Deuteroparaffin 278D
Diatonite 352K
Dyestuffs 278C
Finish for nylon 276B
Fungicides 350G
Gelling agents 354Q
Gum arabic 354P
Hard rubber 274B
Lubricant 274A, 278A, 350M
Methyl toluenesulfonate 271C
Organic chemicals 350T
Pelargonic acid 348C
Pickling acid inhibitors.....354B
Plastic 348O
Plastic insulation 272D
Plastic rubber 350R
Roofing process 350B
Rubber-base coating 272B
Silicone dioxide 272C
Silicone varnish 271D
Sodium 270A
Sulfated ester 276A
Unsaturated glycol 271A
Uranium 354D

EQUIPMENT

Accumulators, steams 352B
Air conditioner 352E
Autoclaves 350S
Battery, storage 267B
Broke, contact water 268C
Buildings, standardized 354S
Cabinet, storage 268D
Chain, riveted roller 268A
Clothing, industrial 348N
Clutch, overload release 268B
Conveyors 352P
Couplings 354C
Drives
  Chain 264A
  Electric, heavy duty variable speed.262B
  Electronic 265B
  Speed 354F
  Variable speed 267A
Dryers, spray 348G
Dust collectors
  Cloth flat bag 352H
Ear inserts 254F
Engines, gas and diesel 354M
Gas burners 354J
Gaskets
  Compressible heat resistant.....251A

Two Postcards—To help you in keeping up-to-date

Chemicals, Equipment, Services, Reprints. Directions on the other side.

PLEASE PRINT:

Name_____

Position_____

Company_____

Address_____

City & State_____

FIRST CLASS
PERMIT No. 64
(Sec. 34.9 P.L.&R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

—4¢ POSTAGE WILL BE PAID BY—

CHEMICAL ENGINEERING
READER SERVICE DEPARTMENT
NEW YORK 36, N. Y.
330 WEST 42nd ST.

Plastic 348A
Heaters 354H
Heat exchangers 352J
Hydraulic cylinders 354R
Instruments....348K, 348L, 348M, 348Q 350A, 352L
Instruments, viscosity 350Q
Controllers
Density 258D
Pyrometer 261D, 261E
Detectors
Aromatic 254E
Gas, hydrocyanic acid.....254A
Electronic regulators 354T
Gages
Film thickness 261B
General line 352G
Indicators, miniature 258B
Liquid level control 354O
Mass spectrometer, plant.....256A
Meters
Infrared energy 260B
Mercury vapor 258A
Monitors, process 352F
Recorders and controllers 352N
Recording, temperature 350P
Sampling 352A
Switch, vacuum 261A
Testing 352I
Transducer
Pressure 258C
Transmitters
Pneumatic pressure 260A
Pressure 348D
Insulation 350L
Insluation, pipe 250A
Labels, warning 254D
Lamps, ultra-violet, explosion proof.254G
Louvers 354I
Maintenance equipment, dual sweeper 350O
Materials handling equipment.....348H 350K
Materials of Construction
Steel, copper clad 251B
Motors 348E
Motors, chemical 265A
Nickel plating system 352Q
Packaging equipment
Bags and liners 350D
Boxes, corrugated 350N
Pipe, polyethylene 350E
Process equipment 354E, 354K
Pumps 348F, 352C
Pumps
Automatic 352R
Centrifugal 352M
Medium duty 352O
Oil hydraulic 348B
Roller 350J
Relay, overload 262C
Rheostat, field, motor controlled...268E
Safety equipment 354G
Safety equipment
Gloves, leather, resist high temperature 254H
Goggles, cover 254C
Seals
All purpose 266A
Heavy duty 266B
Skylight 252A
Steel equipment 350F, 354N
Tool, chain breaking 268F
Valves 348I, 348P, 352D
Valves, quick opening.....254B
Welding rod for non-conductives...262A

SERVICES

Analysis 348J

Two Postcards—One for you, one to pass along

Page numbers & key letters—Circle what you want, fill in reverse side, tear out and mail

. . . These items in this issue as circled below: **(Card expires October 1)**

2	33	63b	79c	113	B130c	152–153c	208B	218A	229C	252a	275	295a	313	320a	321F	322M	340	367b	389
6	34	63c	80	115	131	152–153d	208C	219	229D	253b	276	295b	314	320b	321G	322N	341	367c	TL390
7	35	63d	81a	117	132a	152–153e	208D	220	229E	253c	277	295c	315	320A	321H	322O	343	368	BL390
8	37	63e	81b	119a	132b	152–153f	208E	220A	230A	253	L278	296	316	320B	321I	322P	345a	369	R390
	38	63f	82a	119b	T134	154a	209	221	230B	254	R278	297	317a	320C	321J	322Q	345b	370	L393
10	39	63g	82b	119c	B134	154b	210A	221A	230C	255	280	T298	317b	320D	321K	322R	347	371	R393
11	40–41	64–65	82c	119d	135	155	210B	221B	231	256	T282	B298a	318	320E	321L	322S	348	372a	394
12	42	66a	82d	119e	137	156	210C	221C	232	257	B283	B298b	318A	320F	321M	322T	349	372b	395
13	43	66b	83	121	T138	157	210D	222	232A	258	283	B298c	318B	320G	321N	323	L350	372c	396
14	44	66c	84	122	B138	158	210E	222A	232B	259	T284a	B298d	318C	320H	321O	324–325	R350	373	397
15	45	67a	85	T123a	139	161	210F	222B	233	263a	T284b	L299	318D	320I	321P	327	351	374	398a
16	46	67b	86	T123b	T140	162	210G	223	T234	263b	B284	T300	318E	320J	321Q	329	352	375	398b
17	47	67c	88	T123c	B140	163	210H	223A	B234	263c	285	B300	318F	320K	321R	330	353	376	399
18	48–49	67d	89	T123d	141	164	211	223B	234A	263d	T286a	302	318G	320L	322	331	354	377	400
19	50	68	90	B123	T142	165	212A	224	234B	263e	T286b	303	318H	320M	322A	332	L355	378–379a	401
20	51	69	91	125	B142	166	212B	224A	234C	263f	B286a	304	318I	320N	322B	333a	356	378–379b	402
21	52	70	92–93	126	143	167	212C	225	235	263g	B286b	305	318J	320O	322C	333b	357	380	403
22	53	71	94	T127	144	168	212D	225A	236	263h	287	306	318K	320P	322D	333c	359a	381	404
23	54	72	95	B127a	T145	169	212E	225B	237	263i	T288	TL307	318L	320Q	322E	335	359b	382	405
24	55	73	96	B127b	B145	170	213	226	242	265	B288	BL307	318M	320R	322F	336–337a	360	383	406
25	56–57	74	97	B127c	147	205	214A	226A	243	267	289	R307	318N	321	322G	336–337b	361	384–385	407
26	58	75	99	128a	148	206A	214B	227	244	269	290	308	318O	321A	322H	336–337c	362	386	L408
27	59	76–77a	100	128b	149	207A	215	228A	247	271	291	310	318P	321B	322I	336–337d	363	387	R408
28	60	76–77b	103	129	150	207B	216	228B	248	272	292	311	318Q	321C	322J	336–337e	364	L388	409
29	61	78	104–105	T130	151	207C	216A	228C	249	273	293	T312	318R	321D	322K	336–337f	366	TR388	433
30–31	62	79a	107	B130a	152–153a	207D	216B	229A	250	274	294	B312	319	321E	322L	339	367a	BR388	434
32	63a	79b	109	B130b	152–153b	208A	217	229B	251										

. . . And these items in the Reader Service "Flashback" Section (p. 430)

250A	254D	258B	261C	265A	268B	271B	272D	278C	348F	348M	350C	350J	350Q	352C	352I	352O	354C	354I	354O
251A	254E	258C	261D	265B	268C	271C	274A	278D	348G	348N	350D	350K	350R	352D	352J	352P	354D	354J	354P
251B	254F	258D	261E	266A	268D	271D	274B	348A	348H	348O	350E	350L	350S	352E	352K	352Q	354E	354K	354Q
252A	254G	260A	262A	266B	268E	271E	276A	348B	348I	348P	350F	350M	350T	352F	352L	352R	354F	354L	354R
254A	254H	260B	262B	267A	268F	272A	276B	348C	348J	348Q	350G	350N	352A	352G	352M	354A	354G	354M	354S
254B	256A	261A	262C	267B	270A	272B	278A	348D	348K	350A	350H	350O	352B	352H	352N	354B	354H	354N	354T
254C	258A	261B	264A	268A	271A	272C	278B	348E	348L	350B	350I	350P							

. . . Send me these reprints, I will remit on receipt. (See last Reader Service page for description.)

1 2 3 6 11 14 15 17 18 19 20 22 22a 22b 25 26 27 29 31 32 33 34

More Help for You . . .

It's fast. It's easy. Chemical Engineering's Reader Service will bring you reprints too. You can use the postcard to get up-to-date data on processes, equipment, technology.

Now Ready . . .
Chemical Engineering's Reprint 34

Heat Technology—A chart and 11 articles covering the subject: fuels, combustion, electric heat and refrigeration, through furnaces and construction materials, to heat transfer media, theory and latest equipment . . . . . ($1).

Every Month . . .

This list will help to keep you posted as to what's available for your files. The postcard makes it convenient to order.

1—**Chemical Engineering's Flowsheets**—150 flowsheets of industrial processes. ($1.50).

2 **Data & Methods for Cost Estimation. I**—38 articles, 128 pages . . . equipment, plants, operations. ($1.75).

3 **Data & Methods for Cost Estimation. II**—48 pages, published since April 1952. ($1).

6 **Fire Prevention**—Developments and trends. (50¢).

11 **Materials of Construction**—14th biennial report . . . with directory of materials and manufacturers. ($1).

14 **Organic Unit Processes**—Recent advances. (50¢).

15 **Glass**—How and why it's used in process plants. (50¢).

17 **Sublimation**—Equipment techniques, theory. (50¢).

18 **Agglomeration**—Methods and equipment. (50¢).

19 **New Processing Tools** — Trends and developments in equipment, techniques. (50¢).

20 **Plant Defense** — Control disaster by enemy attack, espionage. (50¢).

22 **Reprint 22a & 22b** ($1).

22a **Process Instrumentation**—48-p. report . . . economics selection, push-button plants. (75¢).

22b **Process Instrumentation**—16-p. chart Guide to Process Instrumentation Elements. 350 instruments. (35¢).

25 **Size Reduction** — Selection of crushing, grinding and pulverizing equipment. (50¢).

26 **Petrochemical Processes** — Flowsheets and descriptions of 23 major processes. (50¢).

27 **Adsorption** — What it can do, its mechanism, latest design practice, expectations for the future. (50¢).

29 **Materials of Construction**—How to evaluate, select, test and use protective coatings. ($1).

31 **The Year for Decisions**—Guidance for chemical management facing critical decisions in the year ahead. (75¢).

32 **Evaporation**—A guide for solving your evaporator problems and evaluating manufacturers' recommendations. (50¢).

33 **Fluidized Solids**—Timely survey of fluidization know-how and application. (50¢).

34 **Heat Technology**—A comprehensive report on production, containment, transport and transfer of heat. (50¢).

Order Now, Pay Later:

The directions on the other side of the postcard make ordering simple.

PLEASE PRINT:

Name_____

Position_____

Company_____

Address_____

City & State_____

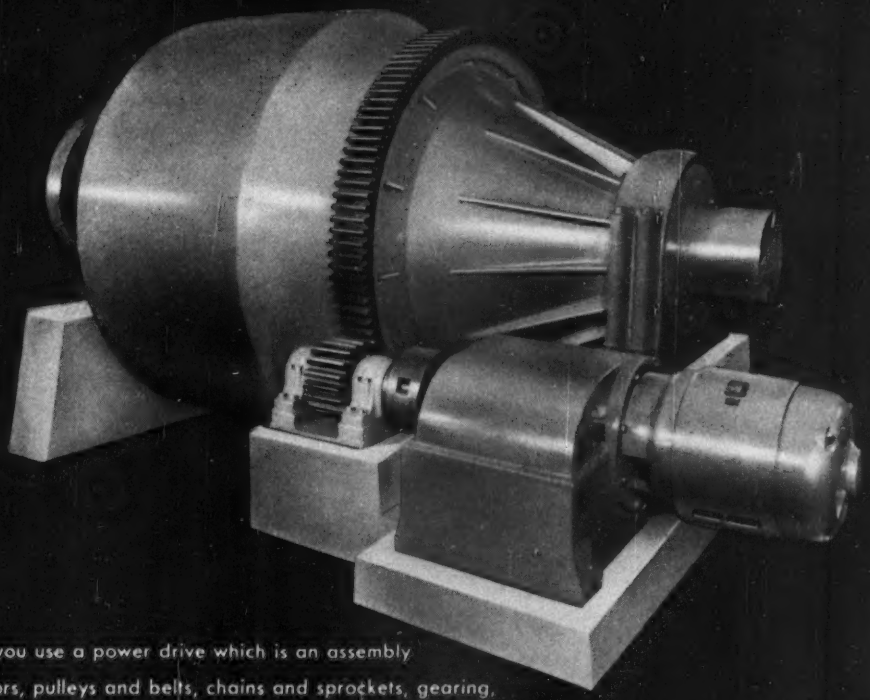
7

FIRST CLASS
PERMIT No. 64
(Sec. 34.9, P.L.&R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

—4¢ POSTAGE WILL BE PAID BY—

CHEMICAL ENGINEERING
READER SERVICE DEPARTMENT
330 WEST 42nd ST.
NEW YORK 36, N. Y.



When you use a power drive which is an assembly of motors, pulleys and belts, chains and sprockets, gearing, speed reducers, etc., you waste time and money in purchasing, handling and assembling these various units into the final drive.

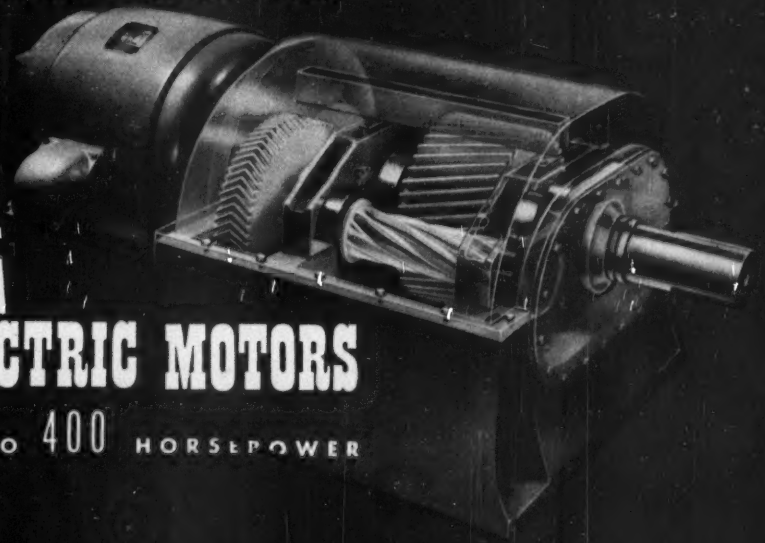
Master power drives designed as complete units with component parts matching size for size and rating for rating offer you considerable saving in space and money . . . especially in the larger sized units.

So don't put up with "make-shift" assemblies when you can select from Master's broad line, standard units which easily combine to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features in one compact unit that you can use RIGHT where you want it.

Use the RIGHT power drive to increase saleability of your motor driven products . . . improve the economy, safety, and productivity of your plant equipment. That's the horsesense way to use horsepower.

BIG ones too

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO



MASTER

ELECTRIC MOTORS

1/8 TO 400 HORSEPOWER

Fired at 1700°F., glassed steel gives you

the corrosion resistance of glass *plus* the working strength of steel

In specially designed furnaces, at temperatures as high as 1700°F., the almost universal corrosion resistance of Pfaudler glass is combined with the working strength of steel. During this high heat period, *an interlocking chemical action takes place between glass and steel.* As the temperature is lowered, forces are set up within the glass itself which make it hard and tough. It has now become glass completely reinforced by steel.

Even at elevated temperatures and pressures, Pfaudler glassed steel is resistant to *all* acids except hydrofluoric. With a new Pfaudler glass, it is possible to handle not only acids but also *alkaline* solutions up to a pH of 12 and 212°F.

Pfaudler glassed steel reactors are built in capacities of 5 to 3500 gallons and for internal pressures as high as 200 p.s.i. These units have agitation, are usually jacketed, and are supplemented by a complete line of glassed steel accessories. Other types of glassed steel equipment include heat exchangers and condensers, distillation assemblies, and columns.

Write for Bulletin 894-F-1.

PFAUDLER

THE PFAUDLER CO., ROCHESTER 3, N. Y.

FACTORIES AT: Rochester, New York; Elyria, Ohio, U.S.A. Leven, Fife, Scotland; Schwetzingen-Baden, Germany